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THE EFFECT OF SOME COMMERCIAL FERTILIZERS ON THE BOTANICAL COMPOSITION AND YIELD OF PERMANENT PASTURES¹

F. S. NOWOSAD²

Macdonald College, McGill University, P.Q.

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INTRODUCTION

Comparatively little attention has been devoted hitherto to the study of pastures in this country. From time to time, the introduction of new species has been undertaken with a view to pasture improvement, and pasture management has begun to receive some critical study. There was a change from the extensive to intensive use of pasture lands, and it became necessary to study the reaction of the pasture complex to this system.

Since changes in the pasture types can be achieved by management and control of grazing, an understanding of the influence of the chief factors on yield and botanical composition becomes necessary.

THE PASTURE PROBLEM

The pastures of the Province of Quebec represented 3,686,100 acres or 20.7% of the total farm land occupied in 1931. For the same year the number of milch cows was 836,000, which means that there were 4.4 acres of pasture per milch cow. It is an additional fact that milch cows depend upon this pasturage for a large part of their sustenance. The average number of days the cows are pastured is 170, so that any improvement or deterioration of this crop is of prime importance to our country.

The permanent pastures of Quebec may be grouped into three classes according to the methods of treatment: (1) those that can be plowed and re-established; (2) those too steep or rough to make plowing and re-seeding practical but which may be improved by some form of top dressing; (3) those more suitable for timber production than pastures. By far the largest area is occupied by the pastures belonging to the second class. These pastures are rough, having stones, stumps, hardhack and moss, and cannot be profitably improved by plowing and re-seeding. It is on pastures of this type that the experiments described in this paper were planned, in order to obtain information on the improvement of permanent pastures.

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²Formerly Graduate Assistant in the Department of Agronomy, Macdonald College, McGill University, P.Q.

REVIEW OF LITERATURE

It is not intended in this paper to give a complete review of the literature bearing on pastures, but only of that which bears on the question of the effects of top dressing on the yield and the botanical composition of pastures.

As early as 1854, Flint (11) wrote that guano mixed with equal quantity of plaster was found beneficial in top dressing pasture lands. Rothamsted Station in England (23) reported on experiments started in 1856 and showed that the fertilizers were found to be very effective in changing the flora and yield of grassland. At Cockle Park, Northumberland County, England (24), basic slag was found to be the most beneficial, while nitrate of soda increased the grasses at the expense of clovers. Stapledon and Thomas (28) found that upland pastures responded relatively better than the lowland to N P K. Davies and Jones (9) showed that complete manurial dressing was the most beneficial, and that phosphorus gave very striking responses. Heavy applications of lime gave significant increases in the yield, while nitrogen has been the one single ingredient which has turned the grass-clover balance in favour of the grasses. Gardner *et al* (13), Stapledon (28, 29) Watson *et al* (32), and Woodman and Underwood (34) have shown that nitrogenous manures in the form of nitro-chalk or sulphate of ammonia increased the yield of pastures and increased the grasses at the expense of clovers. Brenchley (3, 4) studied the effect of lime in pastures at Rothamsted Experimental Station. It was found that a considerable increase was brought about by liming areas receiving artificial manures containing sulphate of ammonia, but that where organic manure was applied with or without artificials the tendency was to decrease the yield. Lime increased the grass species and decreased the weeds.

In United States, Beaumont (2) found that lime was the most effective single material in producing desirable changes in the vegetation, while Barnes (1), Van Alstine and Cook (31), Brown (6, 7), Carrier and Oakley (8), Hutcheson and Wolfe (17), Mortimer and Richards (18), Ohio Station (21), Pennsylvania Station (22), and Skinner and Knoll (27) presented data to show that complete fertilizer was the most effective in increasing the yield and in producing the desirable changes in the flora of pastures. Haskell (16) showed that potash was the most effective of any treatments at Massachusetts Station. Odland *et al* (20) reported on combinations of fertilizers and showed that single elements were beneficial, but that complete minerals with nitrogen were the best.

In New Zealand, Rigg and Askew (25, 26) found that ammonium sulphate used alone or in combination with either superphosphate or superphosphate and potash gave a relatively high increase in yield of dry matter, and the nitrogen favoured the growth of grasses rather than clovers.

Very favourable results were obtained by Whittet (33) in top dressing pastures in New South Wales. Superphosphate increased the yields and produced the desirable changes in the vegetation.

Australian pastures may be improved as shown by Mullett (19). Superphosphate was found to be a fundamental necessity though the addition of nitrogenous fertilizer to superphosphate had possibilities.

Foss (12) at Volbu Station, Norway, showed that superphosphate doubled the yield and stimulated the clovers. Nitrogen was effective and encouraged the stand of grasses.

Thomas (30) and Harcourt *et al* (15), reported on co-operative experiments with fertilizers on pastures in Ontario. The results were very satisfactory and showed large increases in yield, due to nitrogen, phosphorus and potash. There was a definite change in the flora due to the application of fertilizers, an increase in grasses and clovers and a decrease in weeds.

Summarizing the literature bearing on the question of top dressing of permanent pastures in general, it may be stated:

- (1) Superphosphate showed excellent results on most pastures. An increase in yield and desirable species was obtained.
- (2) Potash increased the yields and changed the flora in some pastures, but showed no beneficial effects in others.
- (3) Nitrogen gave marked responses in nearly all pastures. There was an increase in the yield, and the botanical composition generally changed in favour of grass species.
- (4) Generally, lime alone or in combination with mineral fertilizers, showed good results, though deleterious effects were produced when applied with organic manures.

LOCATION AND PLAN OF EXPERIMENT

Permanent pastures were selected in the Quebec eastern townships, in the vicinity of Cowansville, and as far as possible, similar types were taken. These were laid out to measure the influence of the three common fertilizers,—nitrogen, phosphorus and potassium, alone and in combination, and also with and without lime.

The treatments on the plots were as follows:—Ca N P K, Ca P K, Ca, Ca P, Ca K, N P K, P K, Nil, P, and K.

In October, 1930, six such areas were laid out on the farms of Messrs. W. R. Beach, W. E. Dryden, W. W. Mason, F. H. Pickle, A. Robertson and C. Sweet; these experiments will be referred to as Series I. In October, 1931, four more similar areas were laid out on the farms of Messrs. G. A. Doherty, P. V. Hawke, R. R. Mason, and M. Miller; these experiments will be referred to as Series II.

The soils of Series I and Series II are typical brown forest soils, with the exception of W. E. Dryden's (Series I) which has a deeper layer of undecomposed organic matter at the surface and approaches a muck swamp condition. In general this "brown forest" soil profile may be described as follows: A horizon—6 to 10 inches deep, medium brown in colour, having an even distribution of minerals, is loosely packed, fine, sandy loam, high in organic matter; B horizon—12 to 18 inches deep, medium to light yellowish brown in colour, is usually loosely packed, fine to coarse sandy loam, containing much less organic matter than A horizon; C horizon is a little lighter in colour than B horizon, is compacted coarse sandy or gravelly soil, low in organic matter.

The chemical analyses of the soils taken from the untreated areas in each series had the following average percentage figures for the surface and subsoil samples respectively:—pH value — 6.04, 6.22; lime requirement in pounds CaO per acre — 1583, 1266; nitrate nitrogen p.p.m. fresh soil — 20.57, 5.75; moisture when taken — 33.23, 25.75; hygroscopic moisture — 3.21, 1.70; loss on ignition — 12.92, 5.09; total nitrogen (N) 0.45, 0.18; silica (Si O₂) —

62.24, 62.49; total phosphorus (P_2O_5) - 0.20, 0.18; total calcium (CaO) - 1.36, 1.30; total magnesium (MgO) - 1.38, 2.08; total potassium (K_2O) - 3.09, 3.17; total iron (Fe_2O_3) - 5.85, 6.28; sesquioxides (Al_2O_3 , Mn_3O_4 , TiO_2) - 12.99, 15.35. From the above data it may be seen that the soils were extremely high in organic matter, high in total calcium and high in total potash, while percentage of total phosphorus is fairly low.

The plots under study were 1×2 rods, and the following symbols will be used to designate the fertilizer treatments:— Ca. = ground limestone at 2 tons per acre to Series I in October 1930, and the same rate to Series II in October 1931; N = 100 lbs. 15% nitrate of soda in April and 100 lbs. Nitro-chalk in June to Series I in 1931 and 1932, while Series II received 100 lbs. 15% Nitro-chalk in April and again in June 1932; P = 500 lbs. 16% superphosphate to Series I in April 1932, and same rate to Series II in April 1932; K = 160 lbs. 48% muriate of potash to Series I in April 1931 and 160 lbs. to Series II in April 1932.

CLIMATE

Meteorological data were obtained through the Dominion of Canada Meteorological Service from the station located at Farnham (about 15 miles west of the experimental area). The average precipitation for ten years was 38.15 inches, while the mean annual temperature was $42.3^{\circ}F$, and the hours of sunshine were 1757. The rainfall was distributed more favourably during the pasture season in 1932 than in 1931.

METHODS

The experimental plots were located in permanent pastures that were grazed continually. These plots were not fenced off from the main part of the pasture, and the cows had free access to them. Yields were determined by placing a wire cage, covering one square yard of the area in each small plot. All herbage was harvested by means of grass clippers, and the cuts were made close to the ground level and were therefore drastic. The clippings were made four times during the season, and after every clipping the cages were moved to fresh areas which had been grazed continually thereby approximating grazing conditions as much as possible, and at the same time getting a more randomized sample of the vegetation from each plot. The cages were always placed on areas that were a fair representation of the plot under that particular treatment.

In the late summer and early fall, the botanical composition was determined by estimating the degree in which any particular species covered the ground, as expressed by the collective crown spread of all the individual plants (Hanson and Love, (14)). A quadrat 20×20 cms. was used on Series I, and 50×50 cms. on Series II, the quadrat area being divided into 25 equal squares by means of fine steel wire. In calculating the cover-degree, account was taken of all plants which were in the quadrat by expressing them first in units of 1 to 10 per small square, and then calculating them in percentage of the total area. Four quadrats were permanently located on each plot and readings were taken about the same date in 1931 and 1932 on Series I so that they were as nearly comparable as possible. There was no attempt made to estimate the botanical composition on the plots before treatment, because the fertilizers were applied in the spring before growth started.

RESULTS AND DISCUSSION

Since Series I and Series II were started during different years, it is thought best to deal with the results separately before drawing any general conclusions on the effects of fertilizers on the yield and botanical composition of the pastures.

YIELD—SERIES I

Space does not permit giving the yields per farm per clipping for each treatment, but Table 1 shows the actual and relative yields for 1931 and 1932.

TABLE 1.—TOTAL YIELDS IN GRAMS DRY MATTER PER SQUARE YARD AND THE RELATIVE YIELDS WITH NIL (UNTREATED = 100). SERIES I, SEASONS 1931 AND 1932.

| Treatment | 1931 | | 1932 | |
|-----------|--------|----------|--------|----------|
| | Actual | Relative | Actual | Relative |
| Ca N P K | 2857 | 200.49 | 2195 | 169.76 |
| N P K | 2734 | 191.86 | 1853 | 142.31 |
| Ca P K | 2642 | 185.40 | 1871 | 144.70 |
| P K | 2427 | 170.31 | 1656 | 128.07 |
| Ca | 1611 | 113.05 | 1450 | 112.14 |
| nil | 1425 | 100.00 | 1293 | 100.00 |
| Ca P | 2302 | 161.54 | 1653 | 127.84 |
| P | 1966 | 137.96 | 1557 | 120.42 |
| Ca K | 1767 | 124.00 | 1280 | 98.99 |
| K | 1473 | 103.37 | 1137 | 87.93 |
| Total | 21204 | | 15945 | |

In 1931 the treatment which produced the highest yield was Ca N P K, with N P K the second highest. The plots placed in the order of the total productivity were :—Ca N P K, N P K, Ca P K, P K, Ca P, P, Ca K, Ca, K, and nil. In 1932 the order of productivity is slightly changed. The increases due to fertilizers were not as great and although the treatment giving the best result was again Ca N P K, the order was:—Ca N P K, Ca P K, P K, Ca P, P, Ca, nil, Ca K, and K.

A general statistical treatment of the yields in 1931 is presented in Table 2. The yields in 1932 were subjected to similar statistical treatment but only the results are given. The plots were not replicated on the same farm, but farms are taken as replicates. The treatments were not randomized, but the statistical methods followed were those described by Fisher and Wishart (10). In summarized form the results obtained by 'Z' test are as follows:

- (1) Ca (involving all plots) gave significant increases in the total yield in 1931 and 1932. In 1931 the 'Z' value is above the 1% point, while in 1932 it falls between 5 and 1%.

TABLE 2.—STATISTICAL TREATMENT OF THE YIELD. DRY WEIGHT IN GRAMS PER SQUARE YARD. SERIES I, 1931.

| | ANALYSIS OF VARIANCE | | | | | | |
|--|----------------------|------|-------------|-----------------------------|---------|--------------|-------|
| | Sum of squares | D.F. | Mean square | $\frac{1}{2} \log e$ (M.S.) | Z Value | Z values for | |
| | | | | | | 5% | 1% |
| Treatments | 109544.18 | 9 | 12171.57 | 4.7032 | 1.5004 | .3791 | .5490 |
| Farms | 209211.70 | 5 | 41842.34 | 5.3208 | 2.1180 | .4480 | .6294 |
| Error (1) | 27237.73 | 45 | 605.28 | 3.2028 | | | |
| Cuttings | 113393.50 | 3 | 37797.83 | 5.2699 | 2.4905 | .6729 | .9462 |
| Interaction (treat. on cut.) | 13589.58 | 27 | 503.32 | 3.1106 | .3312 | .1906 | .2664 |
| " (cut. on farms.) | 48791.60 | 15 | 3252.77 | 4.0435 | 1.2641 | .2625 | .3660 |
| Error (2) | 35042.31 | 135 | 259.57 | 2.7794 | | | |
| Treatments may be divided as follows: | | | | | | | |
| (1) Ca <i>vs.</i> no Ca (240 plots) | 5548.82 | 1 | 5548.82 | 4.3106 | 1.1078 | .7037 | .9950 |
| (2) Nitrogen treatments (48 plots) | | | | | | | |
| (a) N <i>vs.</i> no N | 2838.38 | 1 | 2838.38 | 3.9754 | .7726 | .7037 | .9950 |
| (b) Ca <i>vs.</i> Ca in this test | 1190.04 | 1 | 1190.04 | 3.5409 | .3381 | .7037 | .9950 |
| (c) Interaction N and Ca | 176.33 | 1 | 176.33 | 2.5861 | | | |
| (3) Mineral treatments (192 plots) | | | | | | | |
| (a) P <i>vs.</i> no P | 48800.63 | 1 | 48800.63 | 5.3977 | 2.1949 | .7037 | .9950 |
| (b) K <i>vs.</i> no K | 5260.55 | 1 | 5260.55 | 4.2839 | 1.0811 | .7037 | .9950 |
| (c) Ca <i>vs.</i> no Ca (less N plots) | 5536.26 | 1 | 5536.26 | 4.3095 | 1.1067 | .7037 | .9950 |
| (d) Interaction P and K | 1856.30 | 1 | 1856.30 | 3.7632 | .5604 | .7037 | .9950 |
| (e) " P and Ca | 26.25 | 1 | 26.25 | 1.6338 | | | |
| (f) " K and Ca | 0.88 | 1 | 0.88 | 1.9303 | | | |
| (g) " PK & Ca | 273.13 | 1 | 273.13 | 2.8049 | | | |

(2) Nitrogen and corresponding no nitrogen plots:—

- (a) N gave significant increases in yield in 1931 and in 1932, the 'Z' value falling between 5 and 1%.
- (b) Ca in this test gave no significant increases in 1931, but in 1932 the 'Z' value was between the 5 and the 1% point.
- (c) There were no significant differences in the yield due to the interaction of N and Ca in 1931 and 1932.

(3) Other treatments less nitrogen plots:

- (a) P is by far the most important element in increasing the yield of vegetation in 1931 and 1932. This element is superior to all others.
- (b) K gave a significant increase in yield in 1931 but not in 1932.
- (c) Ca (less N plots) gave significant increases in yield in 1931, but not in 1932.
- (d) Interaction or combination of P and K gave no significant differences over the sum of differences of these two added separately.
- (e) Interaction of P and Ca was not significant.
- (f) Interaction of K and Ca was not significant.
- (g) Interaction of P K and Ca was not significant.

However, when the standard error test is applied it will be seen that the plots which are significant above the nil (untreated) plots are: Ca N P K, N P K, Ca P K, P K and Ca in 1931 and only Ca N P K in 1932. All other treatments show no significant differences above the unfertilized plots.

Table 3 shows the standard error test for the yields of Series I in 1931. The necessary differences for significance have been calculated so that any group of plots may be examined immediately.

TABLE 3.—STANDARD ERROR TEST OF YIELD. SERIES I, 1931.

| | |
|---|----------|
| Variance of single plot..... | 605.28 |
| Variance of total of 6 plots..... | 3,631.68 |
| Standard error of total of 6 plots..... | 60.26 |
| Standard error of one..... | 10.04 |
| Standard error of difference between 2 means..... | 14.20 |

Mean yields per treatment

| Ca N P K. | N P K. | Ca P K. | P K. | Ca. | Nil. | Ca P. | P. | Ca K. | K. | Mean |
|-----------|--------|---------|--------|-------|-------|-------|-------|-------|-------|-------|
| 119.04 | 113.92 | 110.08 | 101.12 | 67.12 | 59.37 | 95.92 | 81.92 | 73.62 | 61.37 | 88.35 |

Necessary differences for significance.

| Number of plots in group | P = .05 | P = .01 |
|--------------------------|---------|---------|
| 1 vs. 1 | 27.83 | 36.58 |
| 2 vs. 2 | 19.68 | 25.88 |
| 3 vs. 3 | 16.07 | 21.12 |
| 4 vs. 4 | 13.91 | 18.29 |
| 5 vs. 5 | 12.45 | 16.36 |

Actual increase or decrease over nil treatment

| | | | |
|----------|---|-------|-----------------|
| Ca N P K | + | 59.67 | significant |
| N P K | + | 54.55 | significant |
| Ca P K | + | 50.71 | significant |
| P K | + | 41.75 | significant |
| Ca | + | 7.75 | not significant |
| Ca P | + | 36.55 | significant |
| P | + | 22.55 | not significant |
| Ca K | + | 14.25 | not significant |
| K | + | 2.00 | not significant |

YIELD—SERIES II

Table 4 shows the actual and relative yields of Series II. From this table it is seen that the effect of fertilizers is almost similar to that of Series I in 1931, but that Ca had the opposite effect. The treatment that produced the highest yield was N P K. The treatments in the order of production are: N P K, P K, Ca N P K, Ca P K, P, Ca P, Ca K, K, nil and Ca. From the statistical analyses by variance method, the following results were obtained.

- (1) Ca (all plots involved) gave significant differences. From the original data, it is clear that Ca had a depressing effect on yield, so that under the conditions of this experiment Ca had a significant depressing effect.
- (2) Nitrogen and corresponding no nitrogen plots:—
 - (a) N gave significant increase in yield, the values falling between 5 and 1%.
 - (b) Ca in this test, gave significant depressing effect.
 - (c) There were no significant differences in yield due to the interaction of N and Ca.

(3) Other treatments less N plots:—

- (a) P gave significant increases in yield. This element is the most important in increasing the yield.
- (b) K gave significant increases in yield.
- (c) Ca gave no significant differences in plots less N treatments.
- (d) Interaction of P and K gave no significant differences over the sum of the differences of these two added separately.
- (e) Interaction of P and Ca was not significant.
- (f) Interaction of K and Ca was not significant.
- (g) Interaction of P K and Ca was not significant.

TABLE 4.—TOTAL ACTUAL YIELDS IN GRAMS DRY MATTER PER SQUARE YARD AND THE RELATIVE YIELDS WITH NIL (UNTREATED = 100). SERIES II, 1932.

| Treatment | Actual | Relative |
|-----------|--------|----------|
| Ca N P K | 1219 | 159.55 |
| N P K | 1558 | 203.93 |
| Ca P K | 1164 | 152.36 |
| P K | 1288 | 168.59 |
| Ca | 740 | 96.86 |
| Nil | 764 | 100.00 |
| Ca P | 953 | 124.74 |
| P | 1124 | 147.12 |
| Ca K | 909 | 118.98 |
| K | 857 | 112.17 |

By the standard error test, the plots that were significantly superior in yield over nil (untreated) plots were :—Ca N P K, N P K, Ca P K, and P K. All other treatments gave no significant increases or decreases.

DISCUSSION OF YIELD RESULTS

From the statistical treatments of the yields of Series I and Series II, it is clearly seen that there are significant differences due to treatments. When the treatments are analyzed by the 'Z' test or the standard error test, it is seen that Ca had a significant effect in increasing the yields in Series I, but a significant effect in decreasing the yields in Series II. Brenchley (3, 4) obtained results showing that Ca had a depressing effect on the yields on soils high in organic matter or with an application of organic manure. The soils under study are all very similar and such opposite results cannot be explained on the basis of difference in soils. It is very unlikely that such differences are due to chance, because the 'Z' values fall above the 1% point in each case. By the 'Z' test of the yields, we see that all other elements produced similar results in both series. Phosphorus, potash, and nitrogen increased the yield wherever applied. Here it might be well to state that in

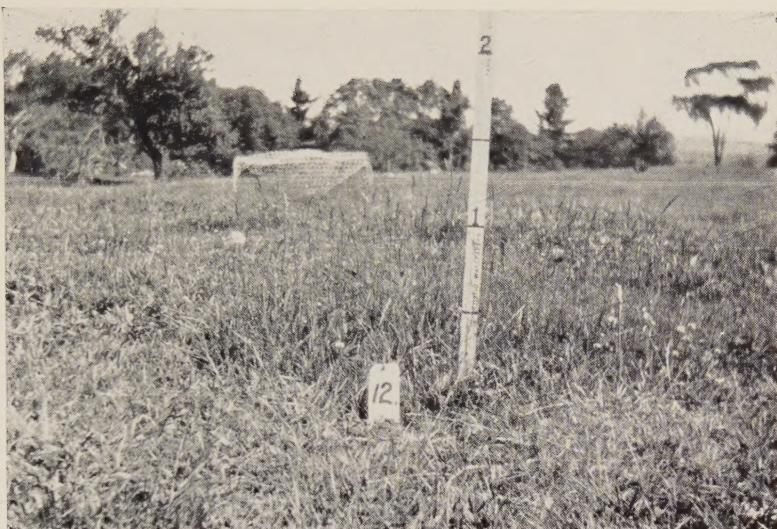


Figure 1. The untreated plot had a high percentage of grasses, but very little clover. (Series 1, F. H. Pickle, nil, 1931).



Figure 2. The application of minerals and nitrogen increased the yield and improved the character of the vegetation. (Series 1, F. H. Pickle, N P K, 1931).

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Series I, 1932, second year effects were measured on all but nitrogen treatments. From the standard error tests we see that the treatments which gave significant increases over the nil (untreated) plots in the first year of their application were similar, being Ca N P K, N P K, Ca P K, P K, and Ca P, while in Series I, 1932 (second year effect) only Ca N P K gave significant increases.

It is too early to draw any conclusions on the longevity of different treatments, but they seem to indicate that under the conditions of these experiments, the differences in the second year are not as great as in the first year.

BOTANICAL COMPOSITION, SERIES I

Space does not permit giving tables showing the percentage of ground covered by different species in 1931 and 1932. There were more species listed in 1932 than in 1931. This may be a seasonal variation. The additional species are of minor importance. However, there was a great reduction in clovers and an increase in grasses, chiefly *Agrostis alba*, from 1931 to 1932. This was a general change and occurred in every treatment, and may be partly accounted for by a lower precipitation during growing months. The precipitation for the five growing months in 1931 was 19.90 inches and only 14.71 inches in 1932. Table 5 gives the percentage of ground covered by different groups of species. In 1931 the plots having the highest percentage of clovers were P K with 46.89%. At the same time all nil (untreated) plots had 17.19% clover. The highest percentage of useful grasses in that year was on Ca plots with 41.38% and the lowest on P K with 26.95%. The same order holds true in 1932. The highest percentage covered by weeds in 1931 was on P plots and the lowest on Ca N P K. In 1932 the highest was on nil (untreated) plots and the lowest on Ca P K. Moss occupied the highest percentage of ground on Ca plots in 1931 and in 1932. The lowest in both years was on P K plots. The percentage of bare ground was highest in both years on the unfertilized plots.

The data showing the percentage of ground covered by clovers, grasses, weeds, miscellaneous plants, moss and bare ground of Series I were analyzed by the variance method and for brevity the results are summarized in chart form in Table 6. This chart gives the difference due to different treatments and shows whether these treatments increased or decreased the percentage of ground covered by different groups of species.

The differences due to treatments were significant for clover in 1931 and 1932, weeds in 1932, moss and bare ground in 1931. Treatments had no significant effect on grasses and weeds in 1931, miscellaneous plants in both years, and moss and bare ground in 1932. When different treatments were examined statistically it is clearly seen that Ca had no significant effect on clovers. It had a significant effect in increasing grasses in 1931 and 1932, decreasing weeds in 1931 and 1932, and decreasing moss and bare ground in 1931. P was significant in increasing clovers in 1931 and 1932, and in decreasing the bare ground in 1931. K could not be studied statistically, because the plots receiving K and Ca K were not estimated for botanical composition.

TABLE 5.—AVERAGE PERCENTAGE OF GROUND COVERED BY CLOVERS, USEFUL GRASSES, WEEDS, MISCELLANEOUS PLANTS AND MOSS AS WELL AS THE PERCENTAGE BARE GROUND. AVERAGE OF SIX AREAS. SERIES I. SEPTEMBER, 1931 AND 1932

| Vegetation | Ca N P K | | N P K | | Ca P K | | P K | | Ca | | Nil | | Ca P - | | P | |
|----------------|----------|-------|-------|-------|--------|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|
| | 1931 | 1932 | 1931 | 1932 | 1931 | 1932 | 1931 | 1932 | 1931 | 1932 | 1931 | 1932 | 1931 | 1932 | 1931 | 1932 |
| Clovers | 45.52 | 33.79 | 43.56 | 29.34 | 45.87 | 28.23 | 46.89 | 36.14 | 19.35 | 16.46 | 17.19 | 13.49 | 37.41 | 27.66 | 29.31 | 21.89 |
| Useful grasses | 35.53 | 45.24 | 30.00 | 47.89 | 32.26 | 48.85 | 26.95 | 38.51 | 41.38 | 53.12 | 31.94 | 42.03 | 32.36 | 46.83 | 28.18 | 42.62 |
| Weeds | 8.59 | 5.08 | 11.94 | 7.25 | 9.21 | 4.78 | 10.11 | 7.93 | 14.62 | 10.38 | 18.11 | 15.80 | 13.05 | 7.26 | 19.26 | 15.12 |
| Miscellaneous | 3.26 | 4.22 | 2.31 | 3.39 | 2.57 | 3.71 | 2.62 | 4.37 | 5.98 | 6.01 | 5.78 | 7.11 | 3.21 | 4.16 | 4.95 | 5.96 |
| Moss | 1.08 | 1.62 | 1.35 | 2.83 | 2.86 | 3.30 | 87 | 1.47 | 4.53 | 4.93 | 3.49 | 2.10 | 2.06 | 1.94 | 2.72 | |
| Bare ground | 6.02 | 10.05 | 10.84 | 9.30 | 7.23 | 11.13 | 12.56 | 11.58 | 11.35 | 9.50 | 22.05 | 18.08 | 19.97 | 12.03 | 16.36 | 11.69 |

TABLE 6.—SUMMARY OF THE STATISTICAL TREATMENT OF THE PERCENTAGE COVER-DEGREE OF CLOVERS, GRASSES, WEEDS, MISCELLANEOUS PLANTS, MOSS AND BARE GROUND. SERIES I. SEPTEMBER, 1931 AND 1932.

| Due to | ANALYSIS OF VARIANCE* | | | | | | | | | | Moss and bare ground significant to | | | | | | |
|---------------------------------------|------------------------|-----|------------------------|-----|----------------------|-----|------------------------------|-----|-----|-----|-------------------------------------|-----|-----|-----|-----|-----|-----|
| | Clovers significant to | | Grasses significant to | | Weeds significant to | | Miscellaneous significant to | | 5% | | 1% | | 5% | | 1% | | |
| | 5% | 1% | 5% | 1% | 5% | 1% | 5% | 1% | 5% | 1% | 5% | 1% | 5% | 1% | 5% | 1% | |
| '31 | '32 | '31 | '32 | '31 | '32 | '31 | '32 | '31 | '32 | '31 | '32 | '31 | '32 | '31 | '32 | '31 | '32 |
| | | X | X | O | O | X | X | O | X | X | X | O | O | X | X | O | X |
| Treatments | | | | | | | | | | | | | | | | | |
| Farms | | | | | | | | | | | | | | | | | |
| Treatments may be divided as follows: | | | | | | | | | | | | | | | | | |
| Ca vs. no Ca | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O |
| P vs. no P | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O |
| Interaction P and Ca | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O |
| “ P K and Ca | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O |
| Nitrogen treatments | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O |
| N vs. no N | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O |
| Ca vs. no Ca | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O |
| Interaction Ca and N | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O | O |

* Legend: X = significant difference. O = no significant difference. + = significant increases. — = significant decreases.

BOTANICAL COMPOSITION, SERIES II

In general, it may be stated that there was more bare ground present in this series than in Series I. Any differences between different treatments were not very great, because the fertilizers were applied in April and the readings were taken in July, so that the fertilizers had little time to show any great effects. It was found that wherever Ca was added to any treatment, the percentage of clover decreased. When these data were examined statistically it was found that Ca had a significant effect in decreasing the percentage of ground covered by clovers. At the same time, grasses and weeds were increased, while miscellaneous plants decreased. P and K increased the percentage of clovers and decreased weeds, miscellaneous plants, moss and bare ground. N had a significant effect in decreasing the clovers, but did not increase the percentage of grasses to any significant extent. N increased the percentage of weeds.

DISCUSSION OF BOTANICAL COMPOSITION

From the statistical analysis of the percentage of ground covered by groups of species in Series I and Series II, it is seen that Ca had an increasing effect on clovers in Series I and a decreasing effect in Series II. This seems to agree very closely with the analysis of the yields. It is clear that P increased the percentage of clovers in all plots and in most cases weeds and bare ground were reduced. K had very similar effects wherever it was possible to measure these differences statistically.

The addition of P to Ca increased the growth of all plants and increased the percentage of clovers.

Nitrogen was another element which produced a significant decrease in the percentage of clover in Series II. However, N in Series I did not show any significant difference.

It is very difficult to explain some of the results presented, because vegetation is of a very complex nature. A stimulation in growth of one species, immediately causes greater competition in the sward, and may suppress other lesser species. For instance, in Series II where Ca increased the grasses, we immediately see a significant decrease in clovers. For these reasons we have to draw conclusions with caution, especially when all data do not show similar results.

SUMMARY AND CONCLUSIONS

The results of the pasture experiments conducted in the Eastern Townships at Cowansville, Que., are summarized as follows:—

A. Yield of herbage.

- (1) In the first experiment (Series I) studied in 1931 and 1932, on brown forest soil, lime (Ca) produced significant increases in yield.
- (2) In the second experiment (Series II) on a similar type of soil and studied in 1932, lime (Ca) produced significant decreases in yield.
- (3) The plots in the order of highest productivity in the first experiment in 1931 (first year effect), were:—Ca N P K, N P K, Ca P K, P K, Ca P, P, Ca K, Ca, K, and nil. Of these plots the ones which were significantly better than the untreated plots were: Ca N P K, N P K, Ca P K, P K, and Ca P.

- (4) The plots in the order of highest productivity in the first experiment in 1932 (second year effect except addition of N) were: Ca N P K, Ca P K, N P K, P K, Ca P, P, nil, and Ca K. Of these plots only Ca N P K was significantly superior to the untreated plots.
- (5) In the second experiment in 1932, the plots in the order of productivity (first year effect) were: N P K, P K, Ca N P K, Ca P K, P, Ca P, Ca K, K, nil, and Ca. Of these, the plots significantly superior to the untreated plots were: N P K, P K, Ca N P K, and Ca P K.

B. Botanical Composition.

- (1) The botanical composition was determined on the plots each year of the experiment. The results are not very definite as yet, but it is seen that treatments have an effect on the proportion of species.
- (2) In the first experiment, lime (Ca) increased the percentage of useful grasses, and decreased the weeds, moss and bare ground. Superphosphate (P) increased the clovers in both years (i.e. first and second year effects). All other elements failed to produce any significant results.
- (3) In the second experiment, lime (Ca) increased the percentage of grass, but also decreased the percentage of clovers. Superphosphate (P) and potash (K) increased the clovers in this experiment. Nitrogen (N) was effective in decreasing clovers, but also increased the percentage of weeds.
- (4) The botanical analysis brought out the importance of such work in the interpretation of the yields obtained from plots under different treatments, but as yet no definite conclusions can be drawn.

ACKNOWLEDGEMENT

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SEED TREATMENT FOR POTATO BLACKLEG¹

JOHN TUCKER and E. W. HARBER²

Central Experimental Farm, Ottawa, Canada.

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Seed potato treatment, with bichloride of mercury or with formalin, to control certain diseases is a practice that has been followed by many growers for some years. With the low prices now in effect, growers are naturally more anxious to know whether the practice is economically sound. They are not particularly interested in ascertaining how the chemicals used destroy diseases; they prefer rather to know whether they can reasonably expect additional returns from the crop, in quality or quantity, sufficient to repay the cost of materials used.

The following summaries have been assembled to show the effect of seed treatment on potato blackleg. Apart from blackleg, chemical treatment may be of value in destroying the organisms on rhizoctonia and scab infested potatoes should it become necessary to use seed of such poor quality, but when seed that is free of these diseases is treated the object presumably is to control blackleg. The value of these summaries, especially from the grower's point of view, lies in the fact that they record results that have been obtained by seed treatment under practical conditions, and in representative potato growing areas in every province of the Dominion.

The field inspection work in connection with the seed potato certification service presented an excellent opportunity of collecting the necessary information. For five successive years the inspectors were required to state on the field reports (1) percentage of plants affected with blackleg, (2) whether seed had been treated, and (3) if so, what chemical used. Two field inspections were made each season and the reports compared and checked, incomplete or doubtful reports being rejected.

For the five year period 1928-1932 inclusive, a total of 48,398 fields were reported upon, representing a total of 173,083 acres of potatoes. Reports on 4,374 fields were discarded as lacking complete and satisfactory details on seed treatments, leaving good reports on 44,024 fields which alone are taken into account. Table 1 shows the results of seed treatment with bichloride of mercury and with formalin, as compared with no treatment. The districts referred to are inspectional districts for seed certification work and in most cases refer to provinces.

In these combined records for the five year period it is apparent that the seed for 23,959 fields was not treated and the average loss of crop from blackleg was .34%; that 13,218 growers treated with bichloride and the average loss of crop was .18%, and that 6,847 growers treated with formalin with an average loss of crop amounting to .31%. In estimating the value of seed treatments, however, a more equitable conclusion would be reached by considering the districts separately. There was not only a wide variation in the number of reports per district, but the two treatments were not equally tested in any one district. Inasmuch as soil types, which have significant bearing on blackleg infection, vary considerably in the different districts,

¹ Contribution from Division of Botany, Experimental Farms Branch, Dominion Department of Agriculture, Ottawa, Ont.

² Senior Plant Disease Inspector and Plant Disease Investigator, respectively.

TABLE 1.—SEED TREATMENT AND BLACKLEG INFECTION. FIVE YEAR PERIOD, 1928-1932.

| District | No Treatment | | | Bichloride of mercury | | | Formalin | | |
|----------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|---------------------------|----------------------------|
| | Number of fields inspected | Number of fields infected | Average per cent infection | Number of fields inspected | Number of fields infected | Average per cent infection | Number of fields inspected | Number of fields infected | Average per cent infection |
| No. 1 | 12916 | 3835 | .85% | 11104 | 2480 | .74% | 282 | 97 | 1.01% |
| No. 2 | 866 | 128 | .73% | 19 | 4 | 1.0% | 985 | 146 | .58% |
| No. 3 | 3786 | 1838 | .47% | 40 | 14 | .27% | 198 | 104 | .48% |
| No. 4 | 3459 | 1691 | 1.39% | 26 | 8 | 1.29% | 3883 | 1212 | 1.11% |
| No. 5 | 1262 | 835 | 1.13% | 1162 | 600 | .68% | 452 | 281 | 1.07% |
| No. 6 | 446 | 212 | 1.38% | 32 | 10 | 1.07% | 27 | 4 | .5% |
| No. 7 | 389 | 94 | 1.69% | 52 | 8 | 1.16% | 277 | 59 | 1.86% |
| No. 8 | 269 | 62 | 1.55% | 43 | 6 | 2.71% | 535 | 98 | 1.41% |
| No. 9 | 566 | 138 | 1.53% | 740 | 125 | .80% | 208 | 30 | .89% |
| | 23959 | 8833 | .94% | 13218 | 3255 | .74% | 6847 | 2031 | 1.05% |

any conclusions reached from the summary for the Dominion as a whole would be most misleading.

Bichloride of mercury was given a relevant trial in districts 1, 5 and 9, and formalin in districts 2, 4, 7 and 9. For these districts individually, the following results were obtained:

Bichloride of mercury treatment:

| | | |
|--------------|-------------------------------|--------------------|
| District 1.— | 12,916 growers did not treat: | average loss: .25% |
| | 11,104 growers treated: | average loss: .16% |
| District 5.— | 1,262 growers did not treat: | average loss: .75% |
| | 1,162 growers treated: | average loss: .35% |
| District 9.— | 566 growers did not treat: | average loss: .37% |
| | 740 growers treated: | average loss: .13% |

TOTAL OF 3 DISTRICTS

| | |
|-------------------------------|--------------------|
| 14,744 growers did not treat: | average loss: .30% |
| 13,006 growers treated: | average loss: .18% |

Formalin treatment:

| | | |
|--------------|------------------------------|--------------------|
| District 2.— | 866 growers did not treat: | average loss: .11% |
| | 985 growers treated: | average loss: .08% |
| District 4.— | 3,459 growers did not treat: | average loss: .68% |
| | 3,883 growers treated: | average loss: .35% |
| District 7.— | 389 growers did not treat: | average loss: .41% |
| | 277 growers treated: | average loss: .39% |
| District 8.— | 269 growers did not treat: | average loss: .36% |
| | 535 growers treated: | average loss: .26% |

TOTAL OF 4 DISTRICTS

| | |
|------------------------------|--------------------|
| 4,983 growers did not treat: | average loss: .54% |
| 5,680 growers treated: | average loss: .29% |

The records over a period of five years show, therefore, that neither bichloride of mercury nor formalin controls blackleg, but that each treatment reduces the losses due to this disease.

In checking over the reports it was apparent that local conditions have considerable effect on the extent of the disease. In certain well favoured locations where the disease does not reach serious proportions, the growers do not generally treat their seed, and still secure crops showing little or no disease. In other locations, where conditions are more favourable to the development of blackleg, growers more generally treat their seed. This procedure most probably results in a reduction of the percentage of infection which it is not possible to indicate here. These conditions should receive consideration when comparing the non-treated with the treated classes.

The seed used in all cases originated from fields which passed inspection the previous season. Taken as a whole it would appear that the results obtained do not warrant the cost of treatment if certified seed is used, but the fact that practically the only fields that showed a relatively large amount of blackleg were planted with untreated seed, appears to indicate that there are individual cases where it might be profitable to practice seed treatment.

CURRENT PUBLICATIONS

THE EFFECT OF AGEING AND HEAT ON THE CHROMOSOMAL MUTATION RATES IN MAIZE AND BARLEY. F. H. Peto, National Research Laboratories, Ottawa. Canadian Journal of Research, 9: 261-264. 1933.

The recent discovery by Navashin (3), that the chromosomal mutation rate in *Crepis* was influenced by aging of the seed, has been corroborated by observations on the mutation rate of corn plants from seed of various ages. A very high chromosomal mutation rate in barley was induced by heat treatments of seed under various conditions of humidity. The most common type of aberration resulting from these treatments appeared to be fracture of the chromosomes either at the attachment constriction, the secondary constriction or the point of attachment of the trabants. The reattachment of fragments to other chromosomes was observed in two instances. Considerable importance is attached to the discovery that a large proportion of the mutant cells are eliminated during the growth of the plant. The principle that only the *fittest survive* seems equally true of cells as of individuals and groups of plants or animals.

THE ECONOMIC ANNALIST

A REVIEW OF AGRICULTURAL BUSINESS PREPARED QUARTERLY BY

THE AGRICULTURAL ECONOMICS BRANCH
DEPARTMENT OF AGRICULTURE
OTTAWA

Vol. III. Nos. 7, 8, 9. July, Aug., Sept., 1933.

THE ECONOMIC SITUATION

The index number of wholesale prices in Canada, computed by the Dominion Bureau of Statistics, rose to 67.6 in June and reached 70.5 in July. In August, however, prices barely held and the index receded to 69.4. The chief factor in the price decline is to be found in the vegetable products group in which the index fell from 69.8 to 65.7. There was also a slight reaction in non-ferrous metals and their products.

Retail Prices.—Retail prices reached the low point of 77.0 in May and held even during June. The July index was up fractionally whereas that for August rose rather sharply to 78.6. Prices of food and fuel were largely responsible. The food index rose from 63.2 in July to 67.8 in August and was the chief cause of the higher index. The sundries group published by the Bureau of Statistics has been revised and thus revision of the total index of retail prices has been necessary.

Employment.—The employment index rose from 87.5 in July to 88.5 in August. After seasonal correction the respective figures were 83.0 and 84.8. The Bureau of Statistics reports that those firms regularly making returns showed an increase in employment of 116,000 persons during the five months from April 1 to August 31.

Physical Volume of Business.—Physical volume of business continued to increase in August. The index advanced from 84.1 in July to 89.8 in August. Similarly, the index of industrial products advanced from 84.1 to 89.5. Substantial gains were made in mineral production in which group the index was 78.3 in July and 95.7 in August. Manufacturing also showed considerable improvement, the index rising from 88.2 to 96.9. Construction, however, was lower, the index declining from 34.0 to 25.5. Electrical power production was higher.

Agricultural Products.—The index number of wholesale prices of Canadian farm products was 60.1 in July but declined to 57.0 in August. The chief cause of the lowered index is to be found in the decline in prices of grain, particularly wheat, although grains did improve their position somewhat toward the end of August. Prices of domestic fresh fruit and vegetables were also lower.

The index of animal products, on the other hand, advanced from 59.0 to 60.5. Better prices for hogs and calves were largely responsible for this increase because cattle and lamb prices were lower.

The index of agricultural marketings rose from 136.3 to 197.2. The movement of grain which is often not large in August was above normal and the index of grain marketings moved up to 224.6. Live stock marketings on the other hand, were lower, falling from 81.2 to 74.5. The movement of cattle was lighter and lamb marketings were somewhat less than normal whereas shipments of calves were higher. Hogs were marketed in about the same volume as in July.

The indexes of cold storage holdings indicate very little change in July and August.

ANNUAL AND MONTHLY INDEX NUMBERS OF PRICES AND PRODUCTION
COMPUTED BY DOMINION BUREAU OF STATISTICS

| Year | Wholesale Prices 1926 = 100 | | | | Retail prices and cost of services (5) | Production (6) 1926 = 100 | | | |
|-----------|-----------------------------|-------------------------|--------------------------|---------------------------|---|-----------------------------------|-------------------------------|-----------------------------------|-----------------------------|
| | All com- modities (1) | Farm products (2) | Field products (3) | Animal products (4) | | Physical volume of business | Industrial pro- duction | Agricul- tural mar- ketings | Cold Storage holdings |
| 1913.... | 64.0 | 62.6 | 56.4 | 77.0 | 65.4 | .... | .... | .... | .... |
| 1914.... | 65.5 | 69.2 | 64.9 | 79.0 | 66.0 | .... | .... | .... | .... |
| 1915.... | 70.4 | 77.7 | 76.9 | 79.2 | 67.3 | .... | .... | .... | .... |
| 1916.... | 84.3 | 89.7 | 88.4 | 92.3 | 72.5 | .... | .... | .... | .... |
| 1917.... | 114.3 | 130.0 | 134.3 | 119.6 | 85.6 | .... | .... | .... | .... |
| 1918.... | 127.4 | 132.9 | 132.0 | 134.7 | 97.4 | .... | .... | .... | .... |
| 1919.... | 134.0 | 145.5 | 142.4 | 152.5 | 107.2 | 71.3 | 65.5 | 48.1 | 47.1 |
| 1920.... | 155.9 | 161.6 | 166.5 | 149.9 | 124.2 | 75.0 | 69.9 | 52.6 | 94.2 |
| 1921.... | 110.0 | 102.8 | 100.3 | 108.5 | 109.2 | 66.5 | 60.4 | 65.2 | 86.4 |
| 1922.... | 97.3 | 86.7 | 81.3 | 99.1 | 100.0 | 79.1 | 76.9 | 82.6 | 82.6 |
| 1923.... | 98.0 | 79.8 | 73.3 | 95.1 | 100.0 | 85.5 | 83.8 | 91.4 | 87.8 |
| 1924.... | 99.4 | 87.0 | 82.6 | 97.2 | 98.0 | 84.6 | 82.4 | 102.5 | 114.6 |
| 1925.... | 102.6 | 100.4 | 98.1 | 105.7 | 99.3 | 90.9 | 89.7 | 97.2 | 108.9 |
| 1926.... | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1927.... | 97.7 | 102.1 | 99.9 | 105.7 | 98.4 | 106.1 | 105.6 | 103.6 | 110.0 |
| 1928.... | 96.4 | 100.7 | 92.6 | 114.3 | 98.9 | 117.3 | 117.8 | 146.7 | 112.8 |
| 1929.... | 95.6 | 100.8 | 93.8 | 112.5 | 99.9 | 125.5 | 127.4 | 101.1 | 109.6 |
| 1930.... | 86.6 | 82.3 | 70.0 | 102.9 | 99.2 | 109.5 | 108.0 | 103.0 | 128.4 |
| 1931.... | 72.2 | 56.3 | 43.6 | 77.6 | 89.6 | 93.5 | 90.4 | 99.0 | 125.7 |
| 1932.... | 66.7 | 48.4 | 41.1 | 60.7 | 81.4 | 78.7 | 74.0 | 114.3 | 120.1 |
| 1933 | | | | | | | | | |
| Jan.... | 63.9 | 43.6 | 35.1 | 57.9 | 79.1 | 68.1 | 62.2 | 56.1 | 112.0 |
| Feb.... | 63.6 | 43.0 | 36.0 | 54.7 | 78.4 | 67.0 | 60.9 | 76.5 | 127.6 |
| Mar.... | 64.4 | 44.7 | 38.0 | 56.0 | 77.8 | 68.4 | 62.5 | 129.0 | 135.8 |
| April.... | 65.4 | 46.8 | 41.1 | 56.4 | 78.1 | 69.8 | 65.1 | 104.1 | 112.7 |
| May.... | 66.9 | 51.2 | 46.9 | 58.4 | 77.0 | 76.4 | 72.7 | 95.4 | 100.4 |
| June.... | 67.6 | 52.6 | 49.4 | 57.9 | 77.0 | 82.2 | 79.8 | 221.9 | 119.9 |
| July.... | 70.5 | 60.1 | 60.8 | 59.0 | 77.2 | 84.1 | 82.6 | 136.3 | 114.5 |
| Aug.... | 69.4 | 57.0 | 54.9 | 60.5 | 78.6 | 89.8 | 89.5 | 197.2 | 114.2 |

1. See Prices and Price Indexes 1913-1928, pp. 19-21, 270-289 and 1913-1931, p. 15.

2. Wholesale prices of Canadian products of farm origin only. See Prices and Price Indexes 1913-1931, p. 33, and Monthly Mimeographs 1932 and 1933.

3. Wholesale prices of grains, fruits and vegetables.

4. Wholesale prices of Animals and Animal Products.

5. Including foods, rents, fuel, clothing and sundries, See Prices and Price Indexes 1913-1928, pp. 181-185, 290-293. 1926 = 100.

Prices and Price Indexes 1913-1931, pp. 122, and Monthly Mimeographs 1932-1933.

6. Monthly Review of Business Statistics, pp. 8, and Monthly Indexes of the Physical volume of business in Canada, supplement to the Monthly Review of Business Statistics, November, 1932.

The apple crop in Canada is estimated by the Fruit Branch to be 16% above last year. In Nova Scotia production is placed at 1,846,000 barrels or 75% above 1932. In New Brunswick the crop is just equal to that of a year ago, 40,000 barrels. In Quebec, latest reports indicate that the crop will be within 2% of last year's crop or 254,000 barrels. The crop in Ontario is 15% above that of a year ago and is placed at 1,064,000. British Columbia has a smaller crop this year, estimated at 4,182,000 boxes, or 18% lower than in 1932.

Butter production during the seven months ended July 1933, showed an increase of 2.1% over that for the same period in 1932. The increase in Alberta is estimated at 11.1%, in Saskatchewan 7.9%, Ontario 5.3%, British Columbia 4.8%, Nova Scotia, 3.1% and Prince Edward Island 3.2%. There was a very slight decline in New Brunswick while production declined 3.5% in Quebec and 1.6% in Manitoba.

Cheese production has been at a somewhat lower level thus far in 1933. The number of boxes graded during the period from November 28, 1932 to September 2, 1933 was 763,659 as compared with 875,567 during approximately the same dates in 1931-32. In 1933, however, 93.87% of the boxes graded first whereas 92.89% graded first in 1932.

Sales of cattle at public yards in Canada up to the end of September this year were 750,288 head as compared with 907,890 in 1932. Sales of sheep during the same period were 298,347 as compared with 266,059 last year. Sales of calves were 237,345 in the first nine months of 1932 whereas during that period in 1933 sales amounted to 240,487 head.

Hog gradings during the same period in 1933 were 2,289,668 as against 2,313,841 in 1932. The hog gradings include direct shipments to packing plants.

PUBLICATION RESUMED

Following curtailment of funds available to this Branch and other Branches of the Government Service it was found to be necessary to cease publication of *The Economic Annalist* which had been issued monthly for two and a half years prior to July 1933. A questionnaire was sent to those whose names were on the mailing list requesting an expression of opinion regarding the usefulness of *The Economic Annalist* and whether they desired to continue to receive similar information. The response justified the belief that *The Economic Annalist* was filling a need for economic information.

We are, therefore, undertaking to publish a quarterly edition containing 16 pages in place of the former 12 page monthly issue. The mailing list has been revised on the basis of replies to our questionnaire.

MARKETING ACTIVITY AMONG SHEEP RANCHERS

During August and September a series of meetings was held in the range sheep areas of Saskatchewan, Alberta and British Columbia. The Dominion Department of Agriculture was represented at these meetings by L. E. Kindt, Economics Branch, and A. A. MacMillan, Live Stock Branch. The findings and suggestions released in a preliminary report by the Economics and Experimental Farms Branches dealing with the sheep ranch survey conducted during the past three years as well as other matters, were discussed with those present.

As a result of this survey and the meetings held, a definite programme for improvement of the range sheep industry has been launched. One of the important phases of the work undertaken has to do with the marketing of lambs. The Live Stock Branch is making arrangements for the shipment of several thousand lambs to feeding centres in Ontario and there has been an encouraging expansion of feeding operations in the irrigated sections of the West. Contracts have been prepared to facilitate negotiations between ranchers and feeders and to provide for a programme which should prove mutually beneficial. Officers of the Department are effecting these arrangements and are providing for the movement of stock. Later a similar programme designed to move breeding ewes from ranches to farms on a contract-share-of-products basis will in all probability be fostered.

It is too early to say how these plans will work out for much depends upon the action of ranchers and farmers, but the foundation is being laid for a worth while development.

EFFORTS TO CONTROL MARKETING BY GOVERNMENT BOARDS OR ORGANIZATIONS ACTING WITH GOVERNMENT SUPPORT¹

J. COKE²

This article is the first of three in which Governmental action with respect to control of marketing, more particularly with respect to the creation of boards will be discussed. Quite obviously, the subject is one about which there may be a wide variation in opinion. Some would have the Government confine its efforts to the enforcement of contracts, maintenance of law and order and the defence of trade routes while others advocate a large measure of control of business, even participation in trade. A careful study of what has been attempted would probably lead to modification of these extreme views.

Governmental intervention in marketing is by no means new. For a short time during the nineteenth century the tendency toward regulation and supervision was slackened. It quickened again, however, during the closing years of the century. For example, there was a distinct movement against monopoly. Early in this century the establishment in Canada of the Dominion Board of Railway Commissioners, the Dominion Board of Grain Commissioners and the Combines Investigation Act, increasing Governmental control over grades and standards of farm products and the supervision of marketing facilities all indicate an extension of the power of Government in business enterprise. Again, the necessity of war time control resulted in further extension of Governmental activity, not only in this country but also in many others. Price regulation during war time had two purposes which were opposed to each other. One was used in stimulating supply and in the earlier stages at least, was not so much concerned with costs and profits. In the case of cost of living control including rationing there was a definite scrutiny of costs and profits, the dominant note of such control being not only to conserve supply but also to eliminate "profiteering". It will be recalled that efforts to regulate the marketing of wheat when the matter was first broached in Canada were opposed by many farmers; later on they made an appeal for the reestablishment of a somewhat similar policy. Thus, it may be claimed that war time policy has exerted an influence on marketing policy during the post-war years, and this was foreseen by some economists; for example, in 1918 Prof. Pigou wrote, "The vast expansion of Governmental control in the economic sphere which has taken place during the war is without parallel in the history of the world. Nobody doubts that in the difficult period of transition that must follow immediately upon the declaration of peace some portion at all events of the control must be retained. But on the question of how far similar control is appropriate as a permanent peace policy there is an acute controversy."³

However war time policy may have affected post war policy, it is clear that when groups of individuals find themselves faced with falling prices and unable to stem the downward course of prices they eventually turn to their Government and expect it to do something.

In attempting to isolate policies of marketing control I have found a distinct classification to be difficult, for if it be inclusive it necessarily results in duplication because emphasis on the means of control has shifted or else several methods may be provided under a single scheme. However, I think that it will be agreed that most of such policies are concerned with supply, although some efforts to increase demand have been noted. Moreover, in many cases, such policies as I have studied indicate that the concern was exhibited in regard to the distribution of a surplus. This is particularly true of those schemes which relate to price control. A brief outline of

¹Largely based on a paper read before the Fifth Annual Meeting of The Canadian Political Science Association held at Ottawa, May 22 and 23, 1933. The original was published in the Proceedings of the Association.

²Assistant Commissioner, Agricultural Economics Branch, Department of Agriculture, Ottawa.

³Pigou, A. C. Government control in war and peace, Economic Journal, Vol. XXVIII, p. 363.

certain types of control exercised by or with the consent of Government will, therefore, be presented.

Brazilian Coffee Valorization.—The valorization of coffee is of interest not only because of the experiment itself but also because of the fact that it ultimately resulted in what was believed to be a permanent policy. Valorization implies an increase in price,⁴ but it should be noted that the circumstances under which this plan was inaugurated require some explanation. There is normally a wide variation in the yield of coffee per tree. The output is very greatly influenced by weather conditions. A favourable season produces a very large crop which reduces the strength of the tree and a short crop results in the following year. These factors are so closely related that a large crop cannot result unless trees are in good condition and weather favourable. Valorization was, therefore, not so much for the purpose of controlling prices as a scheme to overcome the effects of large and small crops, which may be more essential in the case of coffee than in that of some other commodities because of the fact that consumption of coffee does not change greatly with fluctuations in price. "Broadly speaking, actual physical consumption varies to a quite insignificant extent with the price of green coffee, not only because coffee is a staple drink in all those countries where it is used but also because the price of green coffee forms less than one-third of the cost of coffee to the final consumer and the other two-thirds, representing distribution and processing costs, are virtually fixed and unchanging so far as the short period is concerned."⁵

As early as 1902 a high tax was placed on new plantings to discourage expansion. The first valorization took place in 1905, the second in 1918 and the third in 1921.

The plan was inaugurated as a result of the accumulation of large coffee stocks amounting to almost one year's production. A loan was obtained by the State of Sao Paulo on condition that steps be taken to restrict output and exports. Accordingly, it was enacted that there should be a surtax of about 60 cents per bag on coffee exported and the entries of coffee into the port of Santos limited to 50,000 bags (132 pounds per bag) each business day.⁶ This checked the flow to market but was inadequate in so far as the improvement of the market was concerned and, moreover, it left plantation owners in the position of being obliged to hold their coffee without proper storage facilities. The Government then decided to buy a part of the crop and hold it so as to prevent the surplus being thrown on the market. In August, 1908, a law was passed increasing the surtax from three to five francs, about three-quarters of a cent per pound, in addition to the regular export duty of 9%. The law also imposed a 20% surtax on exports over nine million bags during the crop year 1908-09. By this time bankers had begun to have some confidence in the scheme and the necessary credit was forthcoming for its continuance. It is interesting to note that in 1909 the Sao Paulo Government suggested that a tax of 10% payable in kind should be levied and that this coffee should be dumped into the ocean. This suggestion, though approved by bankers, was not carried out, possibly because prices strengthened. In 1914, a surplus of three million bags of coffee still remained. This was largely stored in Germany and was not settled for until 1918 but, it is claimed, the Government eventually made a profit on the whole transaction, although the method of accounting is considered by some to have been open to question.⁷ The second valorization was even more successful; the Government bought at low prices and sold later at high prices. The period of the third valorization was that of 1921-24. The Federal Government then took control,⁸ but had gradually been edging its way into this

⁴Rowe, J. W. F. *Studies in the artificial control of raw material supplies*, No. 3, *Brazilian Coffee*, Memorandum No. 34, Royal Economic Society, London, pp. 6.

⁵Rowe, J. W. F. *Studies in the artificial control of raw material supplies*, No. 3, *Brazilian Coffee*, pp. 7, Royal Economics Society, London.

⁶Wallace, B. J., and Edminster, L. R. *International control of raw materials*, p. 128.

⁷Rowe, J. W. F. *Studies in the artificial control of raw material supplies*, No. 3, *Brazilian Coffee*, pp. 9, Royal Economics Society, London.

⁸A Federal Government loan of paper money was made to the Government of Sao Paulo in 1917. Profits from valorization were to be divided equally.

problem attracted, no doubt, by the success that had attended the efforts of the Sao Paulo Government and also to make available the advantages of the plan to other States. The Sao Paulo Government probably welcomed support. Moreover, coffee is the chief exportable commodity and affects foreign exchange. A change in policy was effected in that the storage of coffee was arranged at Brazilian ports rather than in European centres. The price stabilization feature was thus emphasized.

In 1922 there was an effort to establish "a permanent Institute for the Defense of Coffee" and so develop a permanent policy of valorization. Growers were to become responsible for storage and the regulation of supply was to be the paramount issue. The new scheme began to operate in 1925 and storage facilities were provided in the interior. However, surpluses increased until in 1929 there was again a year's production on hand. Moreover, new planting has been proceeding rapidly. The large crop of 1927-28 had resulted in extension of credit on the basis of coffee values and prospects. Planters were well off; a trade boom resulted and over-extension of credit followed. The financing of stocks of coffee became more difficult for the Sao Paulo banks. Therefore, early in 1930 a loan of twenty million pounds was obtained from international bankers to provide for liquidation of this surplus over a ten-year period. An additional export tax of approximately 73 cents per bag was added to secure this loan. But at the end of the year stocks had not diminished and prices were falling, therefore the Federal Government announced that it would purchase all excess stock as at June 30th, 1931. This was exclusive of the stock required to secure the loan just referred to. Entries to the ports were to be free only so long as they did not exceed one-twenty-fourth of the crop commenced and the crop immediately following. A tax equivalent to six and one-half cents per tree per annum on new plantings other than replacement during a term of five years was provided as well as a tax in kind of all coffee amounting to 20%.

Then a little later an agreement was reached between the Federal and State Governments whereby the States were to collect a special tax equivalent to approximately \$2.43 per bag and deposit their collections to the account of the National Coffee Council daily, to be used exclusively "in the purchase for elimination of the excess of production and of the actual stocks for the purpose of balancing supply and demand . . ." Destruction of surplus stocks by burning began in June 1931 and was reported to be taking place at the rate of one million bags per month. In addition to these steps the Federal Government issued a decree in December 1931 raising the export surtax to the equivalent of \$3.65 (U.S. exchange) per bag, and the Sao Paulo tax of 3s. was abolished. The National Coffee Council was given power to enter into market operations; funds were provided through the Bank of Brazil. In May 1932 the export tax was advanced to the equivalent of \$4.20 per bag but it was subsequently reduced to \$3.74 per bag. Late in 1932 a decree was issued prohibiting the planting of coffee fields during the next three years and an export quota was established.

The Federal Government took complete control of coffee defense in February 1933 when the National Coffee Department was established under the Department of Finance and the programme appeared to be that of purchase and storage of the equivalent of one year's crop, destruction by burning at the rate of 750,000 bags per month and restriction of exports through the application of an export tax of 50 per cent ad valorem. Efforts are also being made through trade agreements to secure better markets for surplus coffee.⁹

In the coffee valorization scheme there appear, therefore, several factors among which are: (1) an export surtax; (2) restriction of entries of coffee to export ports; (3) provision for a tax on new plantings other than replacements; (4) purchases for holding off the market; (5) destruction of surplus stocks; (6) dependence in a large measure on foreign credit.

⁹Lynsky, Meyer. Agricultural price supporting measures. Bulletin of the Pan American Union, July 1933, pp. 569, 572-73.

BUSINESS ANALYSIS OF THE COMBINED OPERATIONS OF TWENTY-FIVE CO-OPERATIVE DAIRY COMPANIES IN CANADA¹

A. E. RICHARDS²

The oldest co-operative dairy on the Economics Branch records which is still engaged in active business is the Stanley Bridge Dairying Company at Stanley Bridge, Prince Edward Island, established in the year 1885. For the past forty-eight years this company has been manufacturing cheese and butter and conducting a business on the co-operative plan. In the same province five years later, the Hamilton Cheese Factory which is affiliated with the Kensington Dairying Association commenced business, and by 1900 there were eleven co-operative dairy factories on the Island serving their farmer patrons. It is regretted that our records do not associate the name of the founder with this early development of co-operation on Prince Edward Island. Co-incident with this development, or shortly after, co-operative dairies were established in other provinces, and to-day are performing a useful service for their farmer patrons throughout the Dominion.

Returns were received from 113 co-operative dairy plants in 1932 in connection with the economic survey of marketing activities of farmers' business organizations throughout Canada. These companies have assets totalling \$3,898,060 with a combined membership of 27,524 producer shareholders. Total business for the year ending December 31, 1931, amounted to \$15,444,833. Returns from individual companies are classified, tabulated and analysed. Financial statements are reduced to operating percentages which permit comparisons among companies of similar type on a common basis. Certain ratio tests are then applied indicative of soundness and efficiency.

Tables 1 and 2 show the combined statements of twenty-five co-operative dairy companies selected from six provinces in Canada. The balance sheet and operating percentages have been worked out for each company and are made available to individual companies for comparison with the average and with other companies. An analysis of this kind shows great variation among companies and certain weaknesses in financial structure and management are brought to the surface. Each of the twenty-five companies is separately owned and controlled. In this "set up" they are combined as one organization in order to give a representative picture of the financial status of co-operative dairying in Canada. On the whole, as brought out in these tables the dairy co-operatives in Canada seem to be in a reasonably sound position and are withstanding the present economic strain in an encouraging manner. It should be borne in mind however, that this analysis applies to only one year and, therefore, cannot be conclusive. Balance sheets are changing, and every day of business brings about a new alignment in the relative position of the items. For that reason balance sheets applicable to the business covering a number of years are necessary to properly evaluate any business and determine whether it is making progress or slipping back. Succeeding years will, therefore, increase the value of statistics which farmers organizations supply to the Economics Branch for study and analysis. Without this information conclusions cannot satisfactorily be drawn or standard ratios determined. It is hoped, however, that the analysis may be of value to individual companies who can use the ratios as checks to determine their status in relation to the average of all.

The Balance Sheet.—An examination of the balance sheet, Table 1, shows that current assets amount to \$1,619,527 and current liabilities \$910,633 or expressed as a ratio 1.78 to 1. This is known as the current ratio. Considered as a single business this would mean that the organization had \$1.78 of readily convertible assets covering each \$1.00 of current indebtedness. A ratio of 2 to 1 is generally looked upon as a desirable standard for many types of business. Among the twenty-five companies in this group some had current ratios as high as 8 to 1 while others showed up rather poorly with only 45 cents of liquid assets for each \$1.00 of current liabilities.

¹This article deals with a section of a Report on Farmers' Business Organization in Canada in the course of preparation by the Agricultural Economics Branch.

²Agricultural Economist, Department of Agriculture, Ottawa.

TABLE 1.—COMBINED BALANCE SHEETS OF TWENTY-FIVE CO-OPERATIVE DAIRY COMPANIES AS AT DECEMBER 31, 1931

| | \$ | % |
|--------------------------------------|-----------|-------|
| ASSETS: | | |
| Current Assets: | | |
| Cash on hand and in bank..... | 70,095 | 2.5 |
| Accounts and notes receivable..... | 655,791 | 23.1 |
| Merchandise inventory..... | 323,896 | 11.4 |
| Other..... | 569,745 | 20.0 |
| | <hr/> | <hr/> |
| Total current assets..... | 1,619,527 | 57.0 |
| Fixed Assets: | | |
| Plant, less depreciation..... | 1,163,948 | 41.0 |
| Other..... | 55,929 | 2.0 |
| | <hr/> | <hr/> |
| Total fixed assets..... | 1,219,877 | 43.0 |
| | <hr/> | <hr/> |
| Total assets..... | 2,839,404 | 100.0 |
| LIABILITIES AND NET WORTH | | |
| Accounts payable. | | |
| Bank loans..... | 256,331 | 9.0 |
| Accrued expenses..... | 30,459 | 1.1 |
| Other..... | 20,369 | 0.7 |
| | <hr/> | <hr/> |
| Total current liabilities..... | 603,474 | 21.3 |
| Mortgages..... | 910,633 | 32.1 |
| Other..... | 89,090 | 3.1 |
| | <hr/> | <hr/> |
| Total fixed liabilities..... | 164,335 | 5.8 |
| | <hr/> | <hr/> |
| Total net worth..... | 253,425 | 8.9 |
| Net Worth: | | |
| Capital Stock..... | 1,098,074 | 38.7 |
| Reserve, general..... | 22,755 | 0.8 |
| Reserve for contingencies..... | 116,066 | 4.1 |
| Other..... | 328,853 | 11.6 |
| Surplus..... | 109,598 | 3.8 |
| | <hr/> | <hr/> |
| Total net worth..... | 1,675,346 | 59.0 |
| Total liabilities and net worth..... | 2,839,404 | 100.0 |

Accounts and notes receivable are a rather large item amounting to \$655,791 or 23.1% of total assets. This indicates a fairly free extension of credit among some companies which have accounts owing them as high as 50% of all assets. The merchandise inventory consists mainly of stocks on hand made up of butter, cheese and other milk products. Expressed as a percentage of total sales this amounts to only 4.9%. The combined value of plant and equipment including real estate amounted to \$1,163,948, less allowance for depreciation, or 41.0% of total assets.

Current debt of \$910,633 is fairly well covered by immediately convertible assets of \$1,619,527. Long term debt and mortgages of \$253,425 becomes a drag on the business unless it is systematically reduced. The 8.9% average is not serious but for a few individual companies it runs as high as 50% of total liabilities and net worth.

Paid up capital stock totalling \$1,098,074 represents direct investment of 15,538 shareholders in the business or an average investment of \$71.59. Shareholding privileges in most companies are limited to producer patrons. For the majority of the dairy companies, the par value of the shares is \$10.00 or \$25.00.

Net Worth and Debt.—The total net worth which represents the capital provided by members to their business is \$1,675,346 or 50% of the total liabilities and net worth. This is a satisfactory position, although some companies drop as low as 20%. For others this percentage exceeds 80%. The worth to debt ratio shown in Table 3 is significant and considered as important as the current ratio in business analysis. In this business it stands 1.44 to 1 which means that ownership is within the business

TABLE 2.—COMBINED OPERATING STATEMENTS OF TWENTY-FIVE CO-OPERATIVE DAIRY COMPANIES FOR YEAR ENDING DECEMBER 31, 1931

| | \$ | % of Total Business | % of Gross Margin |
|----------------------------------|---------------|---------------------|-------------------|
| Total business..... | 6,786,598 | 100.00 | |
| Sales of farm products..... | 6,573,128 | 96.86 | |
| Paid to producers..... | 4,440,290 | 65.43 | |
| Gross margin..... | 2,132,838 | 31.43 | |
| Sales of merchandise..... | 149,512 | 2.20 | |
| Cost of merchandise..... | 138,660 | 2.04 | |
| Gross margin..... | 10,852 | 0.16 | |
| Other receipts..... | 63,958 | 0.94 | |
| Total gross margin..... | 2,207,648 | 32.53 | 100.00 |
| EXPENSES: | | | |
| Wages and salaries..... | 503,025 | 7.41 | 22.79 |
| Rental..... | 11,522 | 0.17 | 0.52 |
| Depreciation..... | 95,475 | 1.41 | 4.32 |
| Supplies..... | 18,362 | 0.27 | 0.83 |
| Insurance..... | 10,935 | 0.16 | 0.50 |
| Taxes..... | 2,880 | 0.05 | 0.13 |
| Advertising..... | 3,536 | 0.05 | 0.16 |
| Interest on borrowed money..... | 5,573 | 0.08 | 0.25 |
| Plant maintenance..... | 982,835 | 14.48 | 44.52 |
| Other..... | 314,208 | 4.63 | 14.23 |
| Total expenses..... | 1,948,351 | 28.71 | 88.25 |
| Net operating income..... | 259,297 | 3.82 | 11.75 |
| Other income..... | 3,799 | 0.06 | 0.17 |
| Net income for distribution..... | 263,096 | 3.88 | 11.92 |
| DISPOSITION OF SURPLUS: | | | |
| Dividends..... | 71,999 | 1.06 | 3.26 |
| Patronage refund..... | 37,467 | 0.55 | 1.70 |
| Carried to reserve..... | 95,681 | 1.41 | 4.33 |
| Total..... | 205,147 | 3.02 | 9.29 |
| Undivided income..... | 57,949 | 0.86 | 2.63 |

and members' interests exceed outside interest by nearly 50%. Some companies show a much stronger position; others are less happily situated with debt exceeding worth.

Business and Plant Value.—The ratio of business to plant value is indicative of plant efficiency. Again considering the combined operations as those of one large company the ratio means that the company did \$5.83 worth of business for each \$1.00 in plant and equipment. Three plants in the survey exceeded \$10.00 of business for each \$1.00 of plant value while six companies dropped below \$2.00 of business for \$1.00 of plant value. A ratio as low as 2 to 1 suggests a low volume of business in relation to the capacity of the plant. This may be due to lack of patronage or falling production but too often the reason lies in over-expansion of plant and equipment in relation to volume of butter-fat. In certain instances the members have been "over-sold" on expensive and elaborate equipment.

Net worth may be accompanied by reasonable investment in fixed assets. If the fixed assets exceed net worth to an unreasonable degree the ratio is out of proportion and the company is said to be over-invested in plant. The ratio net worth to fixed assets for this composite group is 1.37 to 1, although in six plants fixed assets are considerably in excess of net worth and the ratio stands about 0.5 to 1. Working capital is the excess of current assets over current liabilities. For the group, net working capital amounts to \$708,894 which is 24.97% of total assets.

The Operating Statement.—The operating statement shows that the total business of the twenty-five companies grouped together amounted to \$6,786,598. This is

made up of sales of farm dairy products amounting to \$6,573,128 or 96.86% of the total business. Sales of merchandise by these companies which include feeds, fertilizer, farm implements, etc., amount to only \$149,512 or 2.20% of the total. Other receipts of \$63,958 made up of revenue from storage, credits, etc., amount to 0.94%.

Out of the \$6,573,128 which was obtained by the companies from the sale of milk, butter and cheese the producer patrons were paid \$4,440,290 or 68 cents on each dollar of sales. Merchandise which cost \$138,660 was sold to producer patrons for \$149,512 at a margin of profit of 7.8%. Altogether the companies had a margin of over 2 millions or 32.33% of total business out of which to pay operating expenses. Among individual companies variations in gross margins are to be found ranging all the way from 40% down to 15%.

One of the large items of expense is wages and salaries which accounts for 22.79% of total expenses. Taxes and insurance combined use up less than 1%, and less than 0.25% is devoted to advertising expense. Plant maintenance is a large item. Total expenses were 88.25% of the gross margin which leaves a balance of 11.75. This along with other income of 0.17 derived from invested funds, etc., gives 11.92% or nearly one-eighth of the gross margin to be returned to producers as patronage refunds put into reserves or paid out as dividends on stock.

TABLE 3.—RATIO TESTS APPLIED TO THE COMBINED OPERATIONS OF TWENTY-FIVE DAIRY COMPANIES IN CANADA FOR YEAR 1931

| | |
|---|------------|
| Current assets to current liabilities..... | 1.78 to 1. |
| Worth to debt..... | 1.44 to 1. |
| Business to plant value..... | 5.83 to 1. |
| Net worth to fixed assets..... | 1.37 to 1. |
| Per cent working capital of total assets..... | 24.97 |
| Per cent expenses of business..... | 28.71 |
| Business per employee..... | \$15,968 |
| Business per patron..... | \$363 |

All of these companies follow the co-operative principle in the disposition of surplus. The Acts of Incorporation in the majority of the provinces govern the apportionment of the surplus. Usually not less than 10% of the net surplus must be set aside for a reserve fund until an amount has accumulated in the fund equal to at least 35% of the paid-up capital stock. Interest is allowed on paid-up capital stock at a rate varying from 6 to 8%. The remainder is then divided among the patrons and shareholders in proportion to the volume of business which they have done with the Association.

Distribution of Net Income.—Out of a net income of \$263,096 for distribution the amount carried to reserve for these companies was \$95,681 or 36.4%. Interest on paid-up stock held by shareholders amounted to \$71,999 which is equivalent to a dividend of 6.5%. The sum of \$37,467 was refunded to patrons who contributed to the business and the remainder, \$57,949, was left in the undivided income account.

These dairy companies as a group employed 425 persons including management and labour. Salaries and wages averaged \$1,183.59 for each employee for the year. An interesting factor in the analysis is the business per employee which for all companies averaged \$15,963 for the year. For some companies this exceeded \$20,000, for others it dropped as low as \$3,000 which would suggest in the latter instance that labour was not employed to full advantage.

Patrons numbered 18,675 and each contributed on the average \$363 of business. This item varied all the way from over \$4,000 to less than \$100. This variation is largely dependent on the degree of specialization in dairying among patrons of the creamery. For many patrons dairying is a side-line enterprise on their farms.

COST OF TRACTOR OPERATION ON PRAIRIE FARMS IN WESTERN CANADA¹

E. G. GREST²

A large portion of the farm power for field work which was formerly supplied by horses in Western Canada is now supplied by tractors of various makes and sizes. Horses, however, are still the most important source of draught power and will probably hold this place for some years to come. There is a place for both types of draught power on the farms. The chief difficulty is to adjust the power requirements to the size of the farm. A knowledge of tractor costs and the size of farm and hours of use required for economic utilization should, therefore, aid farmers in making proper adjustments.

TABLE 1.—TRACTOR OPERATING COSTS PER TRACTOR AND PER HOUR,
SASKATCHEWAN AND ALBERTA

| Costs for Year Ending April 1, 1931 | Size of Tractor | | | |
|---|-----------------|-------------|----------------|-------------|
| | Two-plow | Three-plow | Four-plow | Five-plow |
| Number of tractors..... | 23 | 149 | 77 | 7 |
| Average hours operated, 1930..... | 246 | 417 | 482 | 386 |
| Average value..... | \$373 | \$842 | \$984 | \$831 |
| Average size of farm, acres of land..... | 376 | 583 | 706 | 771 |
| | Per Tractor | Per Hour | Per Tractor | Per Hour |
| Gallons of fuel used..... | | 1.90 | 2.41 | 2.84 |
| Cost of fuel..... | | \$0.51 | \$0.65 | \$0.77 |
| Gallons of cylinder oil..... | | 0.08 | 0.10 | 0.12 |
| Cost of cylinder oil..... | | \$0.09 | \$0.11 | \$0.15 |
| Cost of grease..... | | \$0.01 | \$0.01 | \$0.01 |
| Parts, plus hired labour, repairing* | | \$0.06 | \$0.04 | \$0.06 |
| | \$ | \$ | \$ | \$ |
| Total cash costs..... | 166.0 | 0.67 | 336.5 | 0.81 |
| Interest at 6%..... | 22.4 | 0.09 | 50.5 | 0.12 |
| Depreciation..... | 78.0 | 0.32 | 159.7 | 0.38 |
| Value of servicing, overhauling..... | 11.5 | 0.05 | 27.6 | 0.07 |
| Hours servicing overhauling..... | 33.9 | 0.14 | 67.7 | 0.16 |
| Total operating costs..... | \$277.9 | \$1.13 | \$574.3 | \$1.38 |
| Per cent cash costs are of total..... | | 59 | | 62 |
| | | | | 68 |

*Hired labour repairing equals less than one-half of a cent per hour for the two, three and four-plow tractors and equals four cents per hour for the five-plow tractors.

The following discussion is based upon an analysis of the operation of 256 tractors of the modern type which are used for nearly all kinds of field and belt power purposes on farms in Western Canada. For purposes of comparison tractors were classified

¹The data used in this article were collected during the summer of 1931 in the Olds, Bow Island, Foremost, Hilda and Irvine districts in Alberta and at Davidson, Craik, Maple Creek and Richmond in Saskatchewan. The study was conducted co-operatively by the Canadian Pioneer Problems Committee, the Department of Farm Management of the University of Saskatchewan, the University of Alberta and the Agricultural Economics Branch of the Federal Department of Agriculture.

Preliminary statement, subject to revision and correction. This summary was prepared from the original manuscript by C. V. Parker, Field Assistant, Agricultural Economics Branch, Ottawa.

²Formerly Field Assistant, Agricultural Economics Branch, now registered in the Graduate School, University of Minnesota, as Saskatchewan Research Foundation Fellow.

according to the number of plows they were drawing on the farms visited. Thus, there were four classifications—two-plow, three-plow, four-plow and five-plow tractors.

Details of the costs of operation per tractor and per hour for tractors of different sizes are presented in Table 1. The bulk of the fuel used was gasoline while some kerosene and small quantities of distillate were also used. The average price paid for gasoline after deducting the rebate on the "gas tax" was 27 cents per gallon.

The cash costs of tractor operations varied from 59% to 68% of the total cost of operation; for the three-plow tractor—the most popular size in use—this figure was 59%. Three-plow tractors were operated 417 hours per year on the average and were found on farms with an average crop area of 583 acres. The cash costs for the year were \$336.50 per tractor or an average of 81 cents per hour. Total operating costs, including interest, depreciation and servicing amounted to \$574.30 per year or \$1.38 per hour. The average cost per hour of the main items of expense were: fuel 65 cents; lubricating oil 11 cents; grease 1 cent; parts and hired labour for servicing 6 cents; interest 12 cents; depreciation 38 cents; and value of servicing and overhauling 7 cents per hour.

The consumption of fuel for three-plow tractors averaged 2.41 gallons per hour, while that of lubricating oil averaged one-tenth of a gallon per hour. Figures for other sizes of tractors are also presented in Table 1.

TABLE 2.—HOURS OPERATED PER YEAR AS RELATED TO TOTAL COST OF OPERATING TRACTORS PER HOUR

| Hours Operated per Year | Size of Tractor | | | | | |
|-------------------------|-----------------|------------------------|---------------------|-----------|------------------------|---------------------|
| | Three-plow | | | Four-plow | | |
| | Number | Average Hours Operated | Power Cost per Hour | Number | Average Hours Operated | Power Cost per Hour |
| 1 - 199 | 34 | 117 | \$2.31 | 8 | 148 | \$2.45 |
| 200 - 399 | 47 | 305 | 1.59 | 25 | 324 | 1.76 |
| 400 - 599 | 33 | 484 | 1.30 | 24 | 507 | 1.52 |
| 600 and over | 35 | 794 | 1.17 | 20 | 781 | 1.47 |
| All tractors | 149 | 417 | 1.38 | 77 | 482 | 1.58 |

Hours Used and Cost per Hour.—The cost per hour of tractor operation is influenced greatly by the number of hours worked as shown by data presented in Table 2. For three-plow tractors when the hours used increased from an average of 117 per tractor to 794, the cost per hour decreased from \$2.31 to \$1.17. Similarly, a decrease in cost from \$2.45 to \$1.47 per hour was recorded for four-plow tractors. A considerable amount of the overhead charges remained constant regardless of the number of hours tractors were used, and, therefore, they form a greater proportion of the total cost when tractors were used for a small number of hours. For this reason it is doubtful if the purchase of a tractor is a wise investment on a farm in Western Canada unless at least 500 hours of effective work are available for it on the owner's farm.

Size of Farm and Hours of Tractor Use.—The size of farm required to give 500 hours of effective tractor work during the year depends on the proportion of the total field work done by the tractor and also on the intensity of farming carried on.

Assuming that tractors would do all the field work, it was found that the size of farm required to enable economical usage of tractor power in all the districts studied was as follows: two-plow tractor—one-half to three-quarters of a section, assuming each quarter section has 140 to 150 acres of cropland; three-plow tractor—three-quarters to one and one-quarter sections; four-plow tractor—from one to one and one-half sections. If horse power is to be used in conjunction with tractor power then an allowance of from 30 to 50 acres of cropland per work horse must be made in the above acreages.

TABLE 3.—COST OF DOING VARIOUS OPERATIONS OF FIELD WORK WITH 3-PLOW TRACTOR POWER

| | Spring & Fall Plowing | Cultivating | Seed-ing | Double Discing | Harrow-ing | Cut-ting |
|---------------------------------------|-----------------------|-------------|----------|----------------|------------|----------|
| Number of outfits..... | 86 | 25 | 32 | 93 | 15 | 21 |
| Common size of implement..... | 3-14" G | 12' | 14' | 10'T | 32' | 10' |
| Acreage per outfit hour..... | 1.24 | 3.66 | 4.22 | 3.21 | 9.90 | 3.01 |
| Average cost per acre, 1930: | | | | | | |
| Cost of draught power..... | 1.12 | 0.38 | 0.33 | 0.43 | 0.14 | 0.46 |
| Cost of man labour..... | 0.33 | 0.11 | 0.09 | 0.13 | 0.04 | 0.22 |
| Total cost..... | 1.45 | 0.49 | 0.42 | 0.56 | 0.18 | 0.68 |
| Estimated average cost per acre 1932: | | | | | | |
| Cost of draught power..... | 1.12 | 0.38 | 0.33 | 0.43 | 0.14 | 0.46 |
| Cost of man labour..... | 0.22 | 0.07 | 0.06 | 0.09 | 0.03 | 0.14 |
| Total cost..... | 1.34 | 0.45 | 0.39 | 0.52 | 0.17 | 0.60 |

Field Work Costs per Acre.—The cost of doing some of the major field operations with a three-plow tractor is presented in Table 3. The costs per acre in 1930 were: plowing \$1.45, cultivating 49 cents, seeding 42 cents, double discing 56 cents, harrowing 18 cents and cutting 68 cents. In 1932 there was a reduction of about 33% in labour costs but operating expenses remained the same as in 1930. The three-plow tractor was the most common size in use, and on the average it performed field work nearly as cheaply as the four-plow and more cheaply than the two-plow tractor. Theoretically, the four-plow tractor should do field work more cheaply because of the saving in man labour costs per acre, but in many cases they were pulling implements of sizes recommended for three-plow tractors. Tractors of all sizes were commonly underloaded, thus resulting in inefficient use of power.

Comparison with Horse Costs.—It was found that the cost of doing major field operations was less with tractors than with horses in 1930. By 1932, however, feed prices and labour costs had decreased so much, while cash costs of tractor operation remained practically the same, that horse power was found to be much more economical than that of the tractor. As a general rule the total cost of doing field operations with horses will be less than with tractors when it requires more than 2 bushels of oats to purchase enough fuel to operate a three-plow tractor for one hour.

ECONOMIC LITERATURE

RUSSEL, SIR E. JOHN. *THE FARM AND THE NATION.* George Allen and Urwin Limited, Publishers, Museum Street, London, 1933, p. 240.

The author of this book, Sir E. John Russel, is Director of the Rothamstead Experimental Station. The book is of direct interest to those people in Canada as well as those in Great Britain who are interested in agricultural problems and the shaping of adequate policies to deal with them.

The first chapter of the book is entitled "The Nation's Food; From Whence Does It Come?" Herein the question is presented, "Is this the best way of using our national wealth, or should we do better to produce more of the food ourselves?" The chapters following are devoted to an answer to this query. Chapter II gives a resume of the "Ups And Downs Of British Agriculture". The author presents an historical review of the trends in British agriculture from very early times down to the present. In Chapter III "Our Farming Land, How We Use It", the author gives an enlightening description of the agricultural areas of Great Britain, the soil types, topography, historical changes and present land utilization. "The Result Of Our Agricultural Efforts" forms the basis of discussion in Chapter IV. The thirty million acres of cultivated land in Great Britain, together with imported animal foods produce 40% of the food supplies for forty-five millions of people (1½ acres, plus imported animal food, feed one person).

Chapters V and VI deal with the Empire as a source of food, and the possibility of increasing the Empire's share of the total imports. Of the 60% of the food imported the Empire sends 21% and foreign countries 39%. Summing up the findings of Chapters V and VI the author states, "We could without difficulty set up all British supplies of milk, potatoes, lamb, mutton and cheese . . . for bread and fruit we could be nearly self-sufficing but probably not quite . . . beef, bacon, butter and eggs it would be difficult but not impossible to become self-sufficient." But the question is raised, "Should we go out of our way to close our markets to them (foreign countries)?"

Some of the farmer's difficulties are presented in Chapter VII. In agriculture, production is slow and cannot be hastened, thus adjustments to price changes are difficult to bring about. Farmers are defeated by falling prices because they cannot change their activities quickly enough. Falling prices cannot be met by reduced wages because of the minimum wage law. In Chapter VIII ways of using the agricultural lands of Great Britain are discussed. Lastly, in Chapter IX the question of displaced men in relation to agriculture is dealt with.

The author concludes by stating that there are three ways in which British agriculture could be treated; it could be "(1) organized for the production from our own soil of as much food as is possible; (2) organized for the provision of work for men displaced by modern methods and by machinery; (3) left to struggle as best it can against unrestricted imports of food from overseas, the farmer being entirely free to gain any possible profit for those working on the land regardless of the total amount of wealth produced."

"These three are entirely distinct and are in the main incompatible . . . The production of the maximum amount of food necessitates protecting the farmer against risk of falling prices during the period of growth." This would involve a contract system with agreed prices or a quota system. "The result of unrestricted imports from overseas is to compel farmers to reduce costs of production, and they do it by reducing labour. Until recently men so displaced have gone overseas or found work in towns . . . the saving in cost of food affected by displacing these men has therefore to be offset by the cost of supporting them in idleness or non-productive work."

"It is possible by means of small holdings and family farms to find work on the land for some of the men displaced from agriculture and from industry. This would somewhat counterbalance the exodus of men from farms because of enlargement and

mechanization of holdings. Small farms, however, are costly to establish, difficult to run successfully and require longer hours and harder work from the operator and his family."

"There seem to be possibilities in the establishment on the land of communities that are largely self-sufficing, provided with modern implements to obviate the hardships"

"The decision between these various possibilities should be made quickly and definitely; the problems will only grow worse with delay."

WELLS, ORIS V. FARMERS RESPONSE TO PRICE IN HOG PRODUCTION. Technical Bulletin, No. 539, United States Department of Agriculture, Government Printing Office, Washington, D.C.

The author's purpose in this bulletin "was to obtain a more complete explanation of the farmers' response to price in hog production and marketing and to develop a simple statistical analysis of the available post-war data which may be easily reworked or extended." In the past, studies of the producer's response to price in hog production have been made from a collective or mass response view point. In the present study the author goes a step further and analyses the responses of individual farmers to price changes.

The findings of other workers were substantiated in this bulletin for it was found that ". . . . farmers increase or decrease their hog production and subsequent marketings from year to year in response to the corn-and-hog price situation (which is best measured by the corn-hog ratio, i.e. the number of bushels of corn required to buy 100 pounds of live hogs) the same year and one year before the change in production is made."

The author also found that the same general type of analysis which will explain the variation in the total United States hog production will also explain the variation in hog production within an individual market district, a state or a broad type of farming area. Hog production response differs slightly in the various sections. "In the last decade it has been made to the corn-hog ratio in the corn belt. In the dairy section it has been modified by the skim milk situation. On the Pacific Coast, the response has been more nearly made to the barley-hog than to the corn-hog ratio. In the South, the response has been directly related to the acreage of corn and is indirectly related to the price of cotton." "So long as the majority of hog producers continue to respond to the corn-hog ratio and feed-supply situation in the future as in the past, the prospective hog-supply situation can be forecast, and the individual producers can profit by adjusting their hog production with reference to the hog-price outlook relative to the price outlook for such alternative enterprises as may be open to them."

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Davis, I. G. A discussion of the accuracy of agricultural census enumeration in the north east. *Journal of The American Statistical Association*, Vol. XXVIII, No. 183, pp. 272-285.

Dominion Bureau of Statistics, Agricultural Branch. The production and distribution of coarse grains—oats. A survey of statistical and other data relating to Canadian oats—production and trade. Dominion Bureau of Statistics, Ottawa.

Fay, C. R. Co-operation and the state. *The Economic Journal*, Vol. XLIII, No. 171, pp. 414-426, September 1933, MacMillan and Company Limited, London.

MacCraken, H. L. Value theory and business cycles. Falcon Press, Inc.

Walter, Karl (Editor). Co-operation and Charles Gide. P. S. King and Son, London, Eng.

World trade barriers in relation to American agriculture. U. S. Senate Document No. 70, 73rd Congress, 1st Session. United States Government Printing Office, Washington, D.C.

Wynn, A. A note on German agriculture. *Economic Journal*, Vol. XLIII, pp. 518-24, September 1933, MacMillan Company Limited, London.

NOTES

A release from the Census and Vital Statistics Branch of the Dominion Bureau of Statistics based on the 1931 census shows that there were 197,204 male wage earners and 1,800 female wage earners engaged in agriculture in 1931. The average earnings of those reporting were \$319 per year for the male employees and \$275 for the females. The male workers were employed on the average of 43.56 weeks of the year and female workers, 43.83 weeks. The average earnings of male employees were \$927 per year in all industries and for female wage earners \$560. Male employees were, on the average, employed 41.12 weeks while female wage earners were employed 46.59 weeks in 1931.

* * *

Officers of the Canadian Society of Agricultural Economics for 1933-34 are as follows: President—Dr. W. V. Longley, Agricultural College, Truro, Nova Scotia; Vice-President—H. C. Bois, Rural Economics Branch, Department of Agriculture, Quebec, P.Q.; Secretary—J. Coke, Economics Branch, Department of Agriculture, Ottawa; Executive Committee—Dr. T. W. Grindley, Dominion Bureau of Statistics, Ottawa, Dr. W. Allen, University of Saskatchewan, Saskatoon; H. R. Hare, Lower Mainland Milk Producers' Association, Vancouver; F. W. Reinoehl, Colonization Finance Corporation, Winnipeg.

* * *

T. G. Major, Tobacco Division, Central Experimental Farm, Ottawa, writing in "The Lighter", September 16th, in regard to Canadian tobacco in the United Kingdom, states, "On the whole the situation is reasonably satisfactory. It is important, however, that anything approaching the nature of a boom in production should be avoided. Only slow, steady development based on a product of increasingly better quality, will result in the permanent establishment of Canadian tobacco in the Old Country market."

* * *

A. Gosselin, Economics Branch, Department of Agriculture, Ottawa, and R. Lecuyer, Rural Economics Branch, Department of Agriculture, Quebec, have completed field work in connection with a study of the cost of producing apples in Quebec. Data have also been secured with regard to the cost of developing an orchard to bearing age.

* * *

The initial payment for pooled wheat will be 45 cents per bushel in store at Fort William, according to a statement recently issued by Saskatchewan Wheat Pool Officials.

* * *

The Okanagan Stabilization Board has been formed to direct the marketing of British Columbia fruit during the season of 1933-34. Major M. V. MacGuire, who was Manager for the Cartel Committee which operated last year, will be Manager for the new Committee.

* * *

The Ontario Milk Producer, September, 1933, reports milk prices in Ontario cities as follows: St. Catharines and Niagara Falls \$1.81 per cwt.; Toronto, Hamilton and Oshawa \$1.81; Kitchener \$1.40; London \$1.00 (since raised \$1.40); St. Thomas \$1.55; Sarnia \$1.30; Windsor \$1.40.

* * *

The Prince Edward Island Co-operative Live Stock Marketing Board was organized on August first. A constitution has been adopted by the Board of Directors. The new organization will handle shipments from 28 clubs on the Island.

L'ECONOMISTE AGRICOLE

REVUE TRIMESTRIELLE DE L'INDUSTRIE AGRICOLE PRÉPARÉ PAR

LA DIVISION DE L'ECONOMIE AGRICOLE
MINISTÈRE FÉDÉRAL DE L'AGRICULTURE
OTTAWA

Vol. III. Nos. 7, 8, 9. Juil., août., sept., 1933.

LA SITUATION ÉCONOMIQUE

De 67.6 qu'il était en juin, l'indice des prix de gros au Canada, computé par le Bureau fédéral de la Statistique, est passé à 70.5 en juillet. En août, léger fléchissement des prix et baisse de l'indice à 69.4, causés principalement par l'avilissement des végétaux dont l'indice est tombé de 69.8 à 65.7. Il y a eu également une légère réaction dans les métaux non ferreux et leurs produits.

Prix de détail.—En mai les prix de détail atteignaient le bas point de 77.0, qu'ils ont maintenu en juin. L'indice de juillet est monté d'une fraction, celui d'août s'est élevé assez brusquement à 78.6, principalement à cause des denrées alimentaires et du combustible, l'indice des premières ayant passé de 63.2 en juillet à 67.8 en août. Une révision du groupe des produits divers, publiée par le Bureau fédéral de la Statistique, a entraîné une révision de l'indice total des prix de détail.

Embauchage.—L'indice de l'embauchage est passé de 87.5 en juillet à 88.5 en août. Après correction pour la saison les chiffres respectifs étaient de 83.0 et 84.8. Les maisons qui soumettent des rapports réguliers disent avoir remis au travail 116,000 personnes pendant les cinq mois du 1er avril au 31 août.

Volume physique des affaires.—Le volume physique des affaires a continué à augmenter en août, l'indice passant de 84.1 en juillet à 89.8 en août, tandis que l'indice des produits industriels montait de 84.1 à 89.5. Il y a eu gain considérable dans la production minérale, l'indice pour ce groupe passant de 78.3 en juillet à 95.7 en août. Les industries manufacturières indiquaient également une amélioration considérable, l'indice s'élevant de 88.2 à 96.9. Seule, l'industrie du bâtiment a rétrogradé, de 34.0 à 25.5. La production de l'énergie électrique a augmenté.

Produits agricoles.—De 60.1 qu'il était en juillet, l'indice des prix de gros des produits de ferme canadiens est tombé à 57.0 en août, principalement à cause de la baisse des prix du grain, spécialement du blé, mais la situation des grains s'est quelque peu améliorée vers la fin d'août. Les prix des fruits et des légumes frais domestiques ont également baissé.

Par contre, l'indice des produits animaux est passé de 59.0 à 60.5. Cette augmentation doit être attribuée principalement à une hausse de prix sur les porcs et les veaux, parce que les prix des bovins et des agneaux ont diminué.

L'indice des ventes agricoles est passé de 136.3 à 197.2. Le mouvement du grain, qui est souvent peu considérable en août, a été supérieur à la normale, et l'indice des ventes de grain est monté à 224.6. D'autre part, les ventes de bestiaux ont fléchi, tombant de 81.2 à 74.5. Les expéditions de bovins ont diminué, les ventes d'agneaux étaient un peu inférieures à la normale, tandis que les expéditions de veaux étaient plus fortes. Il s'est vendu à peu près le même nombre de porcs qu'en juillet.

Les indices des produits frigorifiés indiquent très peu de changement en juillet et en août.

La Division des fruits estime que la récolte de pommes au Canada est de 16 pour cent plus forte que celle de l'année dernière. En Nouvelle-Ecosse, la production est évaluée à 1,846,000 barils, soit 75 pour cent de plus qu'en 1932. Au Nouveau-Brunswick la récolte est exactement la même que celle de l'année dernière, 40,000 barils.

CHIFFRES-INDICES, ANNUELS ET MENSUELS, DES PRIX ET DE LA PRODUCTION
 COMPUTES PAR LE BUREAU FEDERAL DE LA STATISTIQUE

| Année | Prix de gros 1926 = 100 | | | | Prix de détail et coût des services (5) | Production (6) 1926 = 100 | | | |
|------------|-------------------------|-----------------------|-------------------------|----------------------|---|------------------------------|-------------------------|------------------------------|------------------------------|
| | Tous produits (1) | Produits de ferme (2) | Produits des champs (3) | Produits animaux (4) | | Volume physique des affaires | Production industrielle | Ventes de produits agricoles | Produits en entrepôts froids |
| 1913.... | 64.0 | 62.6 | 56.4 | 77.0 | 65.4 | .... | .... | .... | .... |
| 1914.... | 65.5 | 69.2 | 64.9 | 79.0 | 66.0 | .... | .... | .... | .... |
| 1915.... | 70.4 | 77.7 | 76.9 | 79.2 | 67.3 | .... | .... | .... | .... |
| 1916.... | 84.3 | 89.7 | 88.4 | 92.3 | 72.5 | .... | .... | .... | .... |
| 1917.... | 114.3 | 130.0 | 134.3 | 119.6 | 85.6 | .... | .... | .... | .... |
| 1918.... | 127.4 | 132.9 | 132.0 | 134.7 | 97.4 | .... | .... | .... | .... |
| 1919.... | 134.0 | 145.5 | 142.4 | 152.5 | 107.2 | 71.3 | 65.5 | 48.1 | 47.1 |
| 1920.... | 155.9 | 161.6 | 166.5 | 149.9 | 124.2 | 75.0 | 69.9 | 52.6 | 94.2 |
| 1921.... | 110.0 | 102.8 | 100.3 | 108.5 | 109.2 | 66.5 | 60.4 | 65.2 | 86.4 |
| 1922.... | 97.3 | 86.7 | 81.3 | 99.1 | 100.0 | 79.1 | 76.9 | 82.6 | 82.8 |
| 1923.... | 98.0 | 79.8 | 73.3 | 95.1 | 100.0 | 85.5 | 83.8 | 91.4 | 87.6 |
| 1924.... | 99.4 | 87.0 | 82.6 | 97.2 | 98.0 | 84.6 | 82.4 | 102.5 | 114.9 |
| 1925.... | 102.6 | 100.4 | 98.1 | 105.7 | 99.3 | 90.9 | 89.7 | 97.2 | 108.6 |
| 1926.... | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.9 | 100.0 |
| 1927.... | 97.7 | 102.1 | 99.9 | 105.7 | 98.4 | 106.1 | 105.6 | 103.6 | 110.0 |
| 1928.... | 96.4 | 100.7 | 92.6 | 114.3 | 98.9 | 117.3 | 117.8 | 146.7 | 112.8 |
| 1929.... | 95.6 | 100.8 | 93.8 | 112.5 | 99.9 | 125.5 | 127.4 | 101.1 | 109.6 |
| 1930.... | 86.6 | 82.3 | 70.0 | 102.9 | 99.2 | 109.5 | 108.0 | 103.0 | 128.4 |
| 1931.... | 72.2 | 56.3 | 43.6 | 77.6 | 89.6 | 93.5 | 90.4 | 99.0 | 125.7 |
| 1932.... | 66.7 | 48.4 | 41.1 | 60.7 | 81.4 | 78.7 | 74.0 | 114.3 | 120.1 |
| 1933 | | | | | | | | | |
| Jan.... | 63.0 | 43.6 | 35.1 | 57.9 | 79.1 | 68.1 | 62.2 | 56.1 | 112.0 |
| Fév.... | 63.6 | 43.0 | 36.0 | 54.7 | 78.4 | 67.0 | 60.0 | 76.5 | 127.6 |
| Mars... | 64.4 | 44.7 | 38.0 | 56.0 | 77.8 | 68.4 | 62.5 | 129.0 | 135.8 |
| Avril... | 65.4 | 46.8 | 41.1 | 56.4 | 78.1 | 69.8 | 65.1 | 104.1 | 112.7 |
| Mai.... | 66.9 | 51.2 | 46.9 | 58.4 | 77.0 | 76.4 | 72.7 | 95.4 | 100.4 |
| Juin.... | 67.6 | 52.6 | 49.4 | 57.9 | 77.0 | 82.2 | 79.8 | 221.9 | 119.9 |
| Juillet... | 70.5 | 60.1 | 60.8 | 59.0 | 77.2 | 84.1 | 82.6 | 221.9 | 119.9 |
| Août... | 69.4 | 57.0 | 54.9 | 60.5 | 78.6 | 89.8 | 89.5 | 197.2 | 114.2 |

1. Voir Prix et Indices des prix, 1913-1928, pages 19-21, 270-289 et 1913-1931, page 15.

2. Prix de gros des produits de ferme canadiens. Voir Prix et Indices des Prix, 1913-1931, page 33, et miméographes mensuels 1932 et 1933.

3. Prix de gros des grains, fruits et légumes.

4. Prix de gros des animaux et des produits animaux.

5. Y compris la nourriture, le loyer, le combustible, les vêtements et objets divers. Voir Prix et Indices des prix, 1913-1928, pages 181-185, 290-293. 1926 = 100.

Prix et Indices des prix, 1913-1931, page 122, et miméographes mensuels, 1932-1933.

6. Revue mensuelle de la statistique commerciale, page 8 et indices mensuels du volume physique des affaires au Canada. Supplément à la Revue mensuelle de la Statistique commerciale, novembre 1932.

Dans le Québec, les derniers rapports indiquent que la récolte ne sera inférieure que de 2 pour cent à celle de l'année passée, soit 254,000 barils. La récolte de l'Ontario est de 15 pour cent supérieure à celle de l'année dernière, elle est évaluée à 1,064,000 barils. La Colombie-Britannique a une plus petite récolte cette année, évaluée à 4,182,000 caisses, soit 18 pour cent de moins qu'en 1932.

Pendant les sept mois finissant en juillet 1933, la production du beurre a dépassé de 2.1 pour cent celle de la même période en 1932. L'augmentation est évaluée à 11.1 pour cent dans l'Alberta, à 7.9 pour cent dans la Saskatchewan, 5.3 pour cent dans l'Ontario, 4.8 pour cent dans la Colombie-Britannique, 3.1 pour cent en Nouvelle-Ecosse et 3.2 pour cent dans l'Île du Prince-Edouard. Il y a eu une très légère diminution dans le Nouveau-Brunswick et une diminution de 3.5 pour cent dans le Québec et 1.6 pour cent au Manitoba.

La production du fromage a été jusqu'ici à un niveau un peu plus bas qu'en 1933. Le nombre de meules (fromages) classées pendant la période allant du 28 novembre 1932 au 2 septembre 1933, a été de 763,659 contre 875,567 pendant les mêmes dates approximativement en 1931-32. En 1933, cependant, 93.87 pour cent des fromages ont été classés "Premiers" contre 92.89 pour cent en 1932.

Jusqu'à la fin de septembre de cette année, les ventes de bovins aux marchés publics du Canada se sont montées à 750,288 têtes contre 907,890 en 1932. Les ventes de moutons pendant la même période ont été de 298,347 contre 266,059 l'année dernière. Les ventes de veaux ont été de 237,345 dans les premiers neuf mois de 1932, contre 240,487 pendant la même période en 1933.

Pendant la même période en 1933, le nombre de porcs classés a été de 2,289,668 contre 2,313,841 en 1932. Ce chiffre comprend les expéditions directes aux salaisons.

PUBLICATION REPRISE

La publication de l'Economiste Agricole sous forme mensuelle, commencée il y a deux ans et demi et continuée jusqu'au mois de juillet 1933, a dû être suspendue parce que les crédits mis à la disposition de cette Division, aussi bien que des autres Divisions du Gouvernement, ont été réduits. Nous avons soumis un questionnaire à tous ceux auxquels cette publication était adressée, en les priant d'exprimer leur opinion sur son utilité et de nous dire s'ils désiraient continuer à recevoir des renseignements de ce genre. Leur réponse nous confirme dans notre conviction que l'Economiste Agricole, par les renseignements économiques qu'il fournit, répond à un besoin réel.

Nous nous proposons donc de publier une édition trimestrielle, contenant 16 pages au lieu des douze pages de l'ancien numéro mensuel. La liste des abonnés a été revisée sur la base des réponses que nous avons reçues, et l'Economiste ne sera adressé à l'avenir qu'à ceux qui nous ont demandé de maintenir leur nom sur cette liste.

TENTATIVES DE CONTROLE COMMERCIAL PAR DES COMMISSIONS GOUVERNEMENTALES OU DES ORGANISATIONS SOUTENUES PAR LE GOUVERNEMENT¹

J. COKE²

Nous nous proposons dans cette série d'articles de discuter les mesures prises par les Gouvernements, spécialement au moyen de commissions, pour contrôler le commerce. Il est évident que ce sujet se prête à bien des opinions différentes. D'aucuns voudraient que le gouvernement se bornât à faire observer les contrats et la loi, à maintenir l'ordre et à défendre les routes commerciales, tandis que d'autres recommandent une large mesure de contrôle des affaires, et même de participation au commerce. Une étude approfondie des tentatives faites dans ces voies conduirait probablement à une modification de ces vues extrêmes.

L'intervention du gouvernement dans le commerce n'est pas nouvelle, mais la tendance à la réglementation et à la surveillance s'est relâchée pendant quelque temps au cours du dix-neuvième siècle. Elle s'est ranimée, cependant, pendant les dernières années du siècle. Il y a eu, par exemple, un mouvement bien net contre les monopoles. Au commencement de ce siècle, l'établissement au Canada de la Commission fédérale des chemins de fer, de la Commission fédérale du grain et la Loi des recherches sur les monopoles, qui augmente le contrôle du gouvernement sur les catégories et les types des produits agricoles et la surveillance des moyens de vente, indiquent tous une intervention gouvernementale dans les entreprises commerciales.

¹ Basé principalement sur un travail lu devant la cinquième réunion de l'Association canadienne de la science politique tenue à Ottawa le 22 et le 23 mai 1933. L'original a été publié dans le rapport des délibérations de l'Association.

² Commissaire adjoint, Division de l'économie agricole, Ministère de l'agriculture, Ottawa.

D'autre part, la nécessité du contrôle en temps de guerre a provoqué une nouvelle extension de l'activité gouvernementale, non seulement dans notre pays mais dans beaucoup d'autres. La réglementation des prix pendant la guerre avait deux buts contradictoires: il s'agissait en premier lieu de stimuler le ravitaillement, sans s'inquiéter du prix de revient ou du bénéfice, tandis que le contrôle du coût de la vie, qui comprenait le rationnement, comportait une étude précise des frais et des bénéfices. La note dominante de ce contrôle était non seulement de conserver les approvisionnements, mais aussi d'éliminer les "profiteurs". On se souvient que les tentatives faites pour réglementer la vente du blé ont été combattues par bien des cultivateurs lorsque la question est venue sur le tapis pour la première fois au Canada; plus tard ces mêmes cultivateurs ont demandé le rétablissement d'un régime à peu près semblable. On peut donc prétendre que la politique du temps de guerre a exercé un effet sur les régimes de ventes pendant les années d'après-guerre, comme le prévoyaient certains économistes. Par exemple, en 1918, le Prof. Pigou écrivait—"La vaste expansion de contrôle gouvernemental dans la sphère économique, survenue pendant la guerre, est sans parallèle dans l'histoire du monde. Nul ne doute que dans la période difficile de transition qui suivra immédiatement la déclaration de la paix, il faudra conserver une partie de ce contrôle, mais la question est de savoir jusqu'à quel point un contrôle de ce genre peut être exercé permanent dans les temps de paix, et là-dessus la controverse fait rage."³

Quelle qu'ait pu être cependant l'influence exercée par la politique du temps de guerre sur la politique du temps de paix, il est clair que lorsque des groupes d'individus voient une dégringolade subite des prix qu'ils ne peuvent enrayer, ils se tournent vers le gouvernement, dans l'espoir qu'il fera quelque chose.

Il est difficile de faire une classification exacte des systèmes de contrôle; une classification large entraîne nécessairement des répétitions parce que l'importance attachée à certains moyens varie ou que plusieurs moyens peuvent être englobés sous un même système. Cependant, tous conviendront, je crois, que la plupart de ces systèmes se rapportent à l'offre, quoique certains efforts pour augmenter la demande aient été notés. Toutefois, dans bien des cas, les systèmes que j'ai étudiés indiquent que l'objet principalement cherché est la distribution d'un surplus. Ceci s'applique spécialement à ces systèmes qui visent au contrôle des prix. Nous présenterons donc un résumé sommaire de certains types de contrôle exercés par le gouvernement ou avec son consentement.

La valorisation du café au Brésil.—La valorisation du café est intéressante, non seulement pour l'expérience elle-même mais aussi parce qu'il en est résulte ce que l'on croyait être alors une politique permanente. La valorisation comporte une hausse des prix⁴, mais les circonstances dans lesquelles elle a été inaugurée exigent quelques explications. Normalement, le rendement du café par arbre varie beaucoup, suivant les conditions de température. Lorsque la saison est favorable la récolte est abondante, mais l'arbre s'affaiblit et produit beaucoup moins l'année suivante. Ces facteurs sont si intimement reliés que l'on ne peut compter avoir une grosse récolte que si les arbres sont en bon état et si le temps est favorable. L'objet de la valorisation n'est donc pas tant de contrôler les prix que de prévenir les effets des grosses et des petites récoltes, contrôle qui est peut-être plus important dans le cas du café que dans celui de quelques autres produits, parce que la consommation du café ne varie guère, quelles que soient les fluctuations de prix. "Parlant d'une façon générale, on peut dire que la consommation physique réelle ne varie que dans des proportions insignifiantes, quel que soit le prix du café vert, non seulement parce que le café est une boisson régulière, dans tous les pays où il est employé, mais aussi parce que le prix du café vert n'atteint pas le tiers du prix demandé au consommateur, et que les deux autres tiers, représentant les frais de distribution et de traitement, sont virtuelle-

³ Pigou, A. C., *Government Control in War and Peace*, *Economic Journal*, Vol. XXVIII, p. 363.

⁴ Rowe, J. W. F., *Studies in The Artificial Control of Raw Material Supplies*, No. 3, *Brazilian Coffee*, Memorandum No. 34, Royal Economics Society, Londres, p. 6.

ment fixés et immuables en ce qui concerne la courte période.”⁶ Dès 1902 une forte taxe avait été imposée sur les plantations nouvelles pour décourager l’expansion. La première valorisation eut lieu en 1905, la seconde en 1918 et la troisième en 1921.

Ce système fut inauguré à la suite de l’accumulation de gros stocks de café, qui se montaient presque à la production d’une année. L’Etat de São Paulo se procura un emprunt en s’engageant à prendre des mesures pour restreindre la production et les exportations. On décréta donc qu’il y aurait une surtaxe d’environ 60c. par sac sur le café exporté et que les entrées de café dans le port de Santos seraient limitées à 50,000 sacs (132 livres par sac) chaque jour d’affaires.⁷ Cette mesure fit diminuer les arrivages de café mais ne réussit pas à améliorer les cours; elle obligea en outre les propriétaires de plantations à conserver leur café malgré le manque de moyens d’entreposage. Le gouvernement décida alors d’acheter une partie de la récolte pour empêcher que le surplus ne soit jeté sur le marché. En août 1908, une loi fut promulguée portant la surtaxe de trois à cinq francs,-environ trois-quarts d’un cent par livre, outre le droit régulier d’exportation de neuf pour cent. La loi imposait également une surtaxe de vingt pour cent sur les exportations dépassant neuf millions de sacs pendant l’année de récolte 1908-09. Ces mesures inspirèrent confiance aux banquiers qui accordèrent le crédit nécessaire pour leur continuation. Un fait intéressant à noter c’est qu’en 1909 le gouvernement de São Paulo proposa de prélever une taxe de dix pour cent payable en espèces, c’est-à-dire en café, et de jeter ce café dans l’océan. Cette recommandation, qui avait cependant l’approbation des banquiers, ne fut pas mise à exécution, peut-être parce que les prix se raffermirent. En 1914, il restait encore un surplus de trois millions de sacs de café, qui avaient été principalement entreposés en Allemagne et qui n’avaient été payés qu’en 1918, mais on dit que le gouvernement fit un bénéfice sur la transaction, quoique d’aucuns prétendent que le système de comptabilité prêtait à la critique⁸. La deuxième valorisation fut encore plus heureuse; le gouvernement acheta à bas prix et revendit à prix plus élevés. La période de la troisième valorisation fut celle de 1921-24. Le gouvernement fédéral prit alors le contrôle⁹; il était entré graduellement dans la lutte, attiré sans doute par le succès qui avait couronné les efforts du gouvernement de São Paulo et également pour faire connaître les avantages du système aux autres Etats. Il est probable que cet appui fut bien accueilli par le gouvernement de São Paulo. D’ailleurs, le café est le principal produit d’exportation et il affecte le change étranger. On modifia le système; on s’arrangea pour entreposer le café aux ports du Brésil plutôt que dans les centres européens. On revenait ainsi à la stabilisation des prix.

En 1922, il y eu une tentative d’établissement d’un “Institut permanent pour la défense du café”, afin de développer une politique permanente de valorisation. Les producteurs étaient tenus responsables de l’entreposage, et la réglementation de l’offre devait être l’issue principale. Le nouveau système commença à fonctionner en 1925 et des facilités d’entreposage furent pourvues dans l’intérieur. Les surplus augmentèrent cependant, si bien qu’en 1929 on avait encore une année de production en magasin. En outre, les nouvelles plantations s’étaient rapidement développées. La grande récolte de 1927-28 avait résulté en une extension du crédit, basé sur les prix du café et sur les prévisions. Les planteurs étaient à l’aise; le commerce était dans un état florissant et il y eut une surextension de crédit. Il devint de plus en plus difficile pour les banques de São Paulo de financer les stocks de café. On contracta donc chez les banquiers internationaux, au commencement de 1930, un emprunt de vingt millions de livres pour liquider ce surplus sur une période de dix ans. Une taxe supplémentaire d’exportation d’environ 73c. par sac fut ajoutée pour garantir cet emprunt. Mais à la fin de l’année les stocks n’avaient pas diminué et les prix tom-

⁶ Rowe, J. W. F., *Studies In The Artificial Control of Raw Material Supplies*, No. 3, *Brazilian Coffee*, p. 7, Royal Economics Society, Londres.

⁷ Wallace, B. J. et Edminster, L. R. *International Control of Raw Materials*, p. 128.

⁸ Rowe, J. W. F., *Studies In The Artificial Control of Raw Material Supplies*, No. 3, *Brazilian Coffee*, p. 9, Royal Economics Society, Londres.

⁹ Un emprunt d’argent de papier fut consenti par le gouvernement fédéral du gouvernement de São Paulo en 1917. Les bénéfices résultant de la valorisation devaient être divisés à parts égales.

baient, aussi le gouvernement fédéral annonça qu'il achèterait tout l'excès de stocks jusqu'au 30 juin 1931, en plus de la quantité nécessaire pour garantir l'emprunt que nous venons de mentionner. L'entrée au port devait être gratuite tant qu'elle ne dépassait pas un vingt-quatrième de la récolte commencée et de la récolte suivant immédiatement. Une taxe équivalant à six cents et demi par arbre et par an sur les nouvelles plantations autres que les remplacements pendant une période de cinq ans fut établie, ainsi qu'une taxe en espèces sur tout le café se montant à vingt pour cent.

Un peu plus tard une entente fut conclue entre le gouvernement fédéral et les gouvernements d'Etats, par laquelle les Etats s'engagèrent à percevoir une taxe équivalant à environ \$2.43 par sac et à déposer quotidiennement leurs perceptions au compte du Conseil national du café; cet argent devait être employé exclusivement à l'achat, pour l'élimination, de l'excès de production et des stocks actuels pour équilibrer l'offre et la demande. La destruction des stocks de surplus par le feu fut entreprise en juin 1931, elle fut continuée à raison d'un million de sacs par mois. Outre ces mesures, le gouvernement fédéral promulga, en décembre 1931, un décret élévant la surtaxe d'exportation à l'équivalent de \$3.65 (monnaie des E.-U.) par sac, et la taxe de 3s. de São Paulo fut abolie. Le Conseil national du café fut autorisé à entrer dans le commerce, et des fonds furent pourvus par la Banque du Brésil. En mai 1932, la taxe d'exportation fut haussée jusqu'à l'équivalent de \$4.20 par sac, mais elle fut plus tard réduite à \$3.74 par sac. Plus tard en 1932, un décret fut promulgué interdisant toute nouvelle plantation de cafiers pendant trois ans et un contingent d'exportation fut établi.

En février 1933 le gouvernement fédéral assuma le contrôle complet de la défense du café; un Service national du café fut établi sous le Ministère des finances: son programme paraissait comporter l'achat et l'entreposage de l'équivalent de la récolte d'une année, la destruction par le feu à raison de 750,000 sacs par mois et la restriction des exportations par l'application d'une taxe d'exportation de 5% pour cent ad valorem. On fit également des tentatives au moyen d'accords commerciaux pour obtenir de meilleurs débouchés pour le café de surplus.⁹

Le système de valorisation du café comprend donc plusieurs facteurs parmi lesquels les suivants sont à noter: (1) surtaxe d'exportation; (2) restriction des entrées du café aux ports d'exportation; (3) établissement d'une taxe sur les nouvelles plantations autres que les remplacements; (4) achats pour prévenir l'encombrement des marchés; (5) destruction des stocks de surplus; (6) dépendance dans une grande mesure sur le crédit étranger.

⁹ Lynsky, Meyer. Agricultural Price Supporting Measures. Bulletin de la Pan American Union, juillet 1933, p. 569, 572-73.

ANALYSE COMMERCIALE DES OPERATIONS COMBINEES DE VINGT-CINQ COMPAGNIES LAITIERES COOPERATIVES AU CANADA¹

A. E. RICHARDS²

Dé tous les établissements laitiers coopératifs inscrits sur les registres de la Division de l'économie, le plus ancien assurément est la "Stanley Bridge Dairying Company", de Stanley Bridge, I.P.-E., établie en l'année 1885, et qui fonctionne toujours. Depuis quarante-huit ans, cette compagnie fabrique du beurre et du fromage et conduit son industrie sur une base coopérative. Cinq ans plus tard, dans cette même province, la fromagerie de Hamilton, affiliée à la Kensington Dairying Association, ouvrit ses portes et vers 1900, il y avait sur l'Île onze fabriques coopératives desservant leurs patrons. Il est à regretter que le nom du promoteur de ce premier développement de la coopération dans l'Île du Prince-Edouard ne soit pas

¹ Cet article a trait à une partie d'un rapport actuellement en cours de préparation à la Division de l'économie agricole, traitant de l'organisation commerciale des cultivateurs au Canada.

² Economiste agricole, Division de l'économie agricole, Ministère de l'agriculture, Ottawa.

TABLEAU 1.—BILAN COMBINE DE VINGT-CINQ COMPAGNIES COOPERATIVES LAITIERES
AU 31 DECEMBRE 1931.

| ACTIF: | \$ | % |
|--|-----------|-------|
| Actif courant: | | |
| Argent en caisse et en banque..... | 70,095 | 2.5 |
| Comptes et billets encaissables..... | 655,791 | 23.1 |
| Inventaire (marchandises)..... | 323,896 | 11.4 |
| Divers..... | 569,745 | 20.0 |
| Actif courant total..... | 1,619,527 | 57.0 |
| Actif fixe: | | |
| Etablissement, moins dépréciation..... | 1,163,948 | 41.0 |
| Divers..... | 55,929 | 2.0 |
| Actif fixe total..... | 1,219,877 | 43.0 |
| Actif total..... | 2,839,404 | 100.0 |
| PASSIF ET VALEUR NETTE: | | |
| Comptes payables..... | 256,331 | 9.0 |
| Emprunts de banque..... | 30,459 | 1.1 |
| Déboursés..... | 20,369 | 0.7 |
| Divers..... | 603,474 | 21.3 |
| Passif courant total..... | 910,633 | 32.1 |
| Hypothèques..... | 89,090 | 3.1 |
| Divers..... | 164,335 | 5.8 |
| Passif fixe total..... | 253,425 | 8.9 |
| Valeur nette: | | |
| Capital-actions..... | 1,098,074 | 38.7 |
| Réserve générale..... | 22,755 | 0.8 |
| Réserve pour imprévu..... | 116,066 | 4.1 |
| Divers..... | 328,853 | 11.6 |
| Surplus..... | 109,598 | 3.8 |
| Valeur nette totale..... | 1,675,346 | 59.0 |
| Passif total et valeur nette..... | 2,839,404 | 100.0 |

connu. A la même époque, ou peu après, des laiteries coopératives furent établies dans d'autres provinces et aujourd'hui ces établissements rendent un service utile à leurs patrons d'un bout à l'autre du Canada.

En 1932, 113 coopératives ont rempli le questionnaire qui leur avait été soumis sur le recensement économique des affaires des organisations commerciales agricoles au Canada. Ces compagnies ont un actif total de \$3,898,060 et comptent, à titre de membres, 27,524 actionnaires producteurs. Le chiffre total d'affaires pour l'année finissant le 31 décembre 1931 se montait à \$15,444,833.

Les rapports des différentes compagnies sont classés, compilés et analysés; les états de comptes sont réduits en pourcentages, qui permettent de faire des comparaisons entre les compagnies d'un même type. On applique alors certaines épreuves de proportions relatives ou "relations" pour déterminer le rendement et la solidité de l'entreprise.

Les Tableaux 1 et 2 donnent les rapports combinés de vingt-cinq coopératives laitières, choisies dans six provinces canadiennes. Le bilan et les pourcentages de fonctionnement ont été calculés pour chaque compagnie et sont mis à la disposition des différentes compagnies qui peuvent ainsi les comparer avec la moyenne ou avec ceux d'autres coopératives. Une analyse de ce genre révèle de grandes variations et met en lumière certains points faibles dans la structure financière et la direction. Chacune des vingt-cinq compagnies est sous une direction et un contrôle séparés. Elles sont combinées dans cette présentation en une même organisation afin de donner

une image fidèle de l'état financier de l'industrie laitière coopérative au Canada. En somme, comme le font ressortir ces tableaux, les coopératives laitières canadiennes paraissent être dans une situation raisonnablement saine et résistent d'une façon encourageante à l'épreuve économique actuelle.

Il est à noter cependant que cette analyse ne couvre qu'une année et ne saurait donc être concluante. Comme les bilans changent sans cesse et que chaque jour nouveau apporte un nouvel alignement dans la position relative des comptes, il serait nécessaire d'avoir des bilans couvrant un certain nombre d'années pour faire une appréciation raisonnable de l'industrie et voir si réellement elle fait des progrès ou si elle rétrograde. La valeur des statistiques que les organisations de cultivateurs fournissent à la Division de l'économie s'accroîtra donc avec les années. Il serait impossible, sans ces renseignements, de tirer des conclusions satisfaisantes ou de déterminer des proportions relatives régulières. Il faut espérer cependant que l'analyse sera utile aux différentes compagnies qui peuvent employer les "relations" comme base de comparaison pour déterminer leur statut relativement à la moyenne générale.

Le bilan.—L'examen du bilan (Tableau 1) montre que l'actif courant est de \$1,619,527 et le passif courant de \$910,633, soit une proportion de 1.78 à 1; c'est ce que l'on appelle la "relation courante". En d'autres termes, l'organisation, considérée comme un tout, avait \$1.78 d'actif facilement convertible, couvrant chaque dollar de dette courante. Une relation de 2 à 1 est généralement considérée comme une base avantageuse pour plusieurs sortes de commerces. Parmi les vingt-cinq compagnies de ce groupe, il y en avait avec des relations courantes s'élevant jusqu'à 8 à 1 tandis que d'autres étaient en assez mauvais état, n'accusant seulement que 45 cents d'actif liquide pour chaque dollar de dettes courantes.

Les comptes et les billets encaissables forment un total assez considérable, se montant à \$665,791 soit 23.1 pour cent de l'actif total. Certaines compagnies ont des créances qui se montent jusqu'à 50 pour cent de leur actif total, ce qui indique qu'elles font beaucoup de crédit. L'inventaire des marchandises se compose principalement de produits en magasin, de beurre, de fromage et d'autres produits laitiers. Exprimé en pourcentage des ventes totales, ceci ne se monte qu'à 4.9 pour cent. La valeur combinée de l'installation et de l'outillage, y compris les immeubles, se monte à \$1,163,948, moins la dépréciation, soit 41.0 pour cent de l'actif total.

La dette courante, qui est de \$910,633, est assez bien couverte par un actif immédiatement convertible de \$1,619,527. La dette à long terme et les hypothèques qui se montent à \$253,425 sont un poids qui pèse lourdement sur l'industrie, à moins qu'on ne prenne les moyens de les réduire systématiquement. La moyenne de 8.9 pour cent n'est pas grave, mais elle atteint jusqu'à 50 pour cent du passif total et de la valeur nette pour certaines compagnies.

Le capital-actions versé, qui forme un total de \$1,098,074, représente un placement direct de 15,538 actionnaires dans le commerce ou un placement moyen de \$71.59. Les priviléges d'actionnaires dans la plupart des compagnies sont limités aux patrons. Pour la majorité des compagnies laitières, la valeur au pair des actions est de \$10. ou de \$25.

Valeur nette et dette.—La valeur nette totale, qui représente le capital fourni par les membres à l'industrie est de \$1,675,346, soit 59 pour cent du passif total et de la valeur nette. C'est là une situation satisfaisante quoique certaines compagnies tombent jusqu'à 20 pour cent. Pour d'autres, le pourcentage dépasse 80 pour cent. La relation de la valeur à la dette, consignée au tableau 3, est significative; on considère qu'elle est tout aussi importante que la relation courante dans une analyse commerciale. Dans cette industrie, elle est de 1.44 à 1, ce qui signifie que l'industrie appartient aux intéressés et que les intérêts des membres dépassent ceux des étrangers par près de 50 pour cent. Certaines compagnies se trouvent dans une situation encore plus favorable sous ce rapport, mais d'autres sont moins solides car leur dette dépasse leur valeur.

Affaires et valeur de l'établissement.—La relation entre les affaires et la valeur de l'établissement indique le rendement. Prenons encore une fois les opérations combinées comme celles d'une grande compagnie, et nous voyons par la relation que la compagnie a fait \$5.83 d'affaires pour chaque dollar en établissement et en outillage. Trois établissements dans cette enquête ont fait plus de \$10 d'affaires pour chaque \$1 de valeur d'établissement tandis que six compagnies n'ont pas fait \$2 d'affaires par \$1 de valeur d'établissement. Cette faible relation de 2 à 1 indique un faible chiffre d'affaires par rapport à la capacité de l'installation. C'est peut-être à cause d'un manque de patronage ou d'une production décroissante mais trop souvent il faut en chercher la raison dans une trop grande expansion de l'établissement et de l'outillage par rapport à la quantité de gras de beurre. Dans certains cas, les membres ont acheté un équipement trop coûteux et trop élaboré.

La valeur nette peut être accompagnée d'un placement raisonnable en actif fixe. Si l'actif fixe dépasse la valeur nette d'une façon exagérée, la relation est hors de proportion, et l'on dit alors que la compagnie a fait un trop gros placement dans l'établissement. La relation "valeur nette à actif fixe" pour ce groupe composé est de 1.37 à 1 mais dans six établissements l'actif fixe est bien supérieur à la valeur nette et la relation est d'environ 0.5 à 1. Le capital d'exploitation est l'excès de l'actif courant sur le passif courant. Le capital net d'exploitation pour le groupe se monte à \$708,894 soit 24.97 pour cent de l'actif total.

Rapport d'opération.—Le rapport des opérations montre que le commerce total des vingt-cinq compagnies groupées ensemble se montait à \$6,786,598; ce total se compose de ventes de produits laitiers de ferme, au montant de \$6,573,128 soit 96.86

TABLEAU 2.—ETATS DE COMPTES COMBINES DE VINGT-CINQ COMPAGNIES COOPÉRATIVES LAITIERES POUR L'ANNEE FINISSANT LE 31 DECEMBRE 1931.

| | \$ | % du chiffre d'affaires total | % de la marge brute totale |
|---|-----------|-------------------------------|----------------------------|
| Chiffre d'affaires total | 6,786,598 | 100.00 | |
| Ventes de produits de ferme | 6,573,128 | 96.86 | |
| Payé aux producteurs | 4,440,290 | 65.43 | |
| Marge brute | 2,132,838 | 31.43 | |
| Ventes de marchandises | 149,512 | 2.20 | |
| Coût des marchandises | 138,660 | 2.04 | |
| Marge brute | 10,852 | 0.16 | |
| Autres recettes | 63,958 | 0.94 | |
| Marge brute totale | 2,207,648 | 32.53 | 100.00 |
| EXPENSES: | | | |
| Gages et salaires | 503,025 | 7.41 | 22.79 |
| Loyer | 11,522 | 0.17 | 0.52 |
| Dépréciation | 95,475 | 1.41 | 4.32 |
| Fournitures | 18,362 | 0.27 | 0.83 |
| Assurance | 10,935 | 0.16 | 0.50 |
| Taxes | 2,880 | 0.05 | 0.13 |
| Réclame | 3,536 | 0.05 | 0.16 |
| Intérêt sur les emprunts | 5,573 | 0.08 | 0.25 |
| Entretien des établissements | 982,835 | 14.48 | 44.52 |
| Divers | 314,208 | 4.63 | 14.23 |
| Dépenses totales | 1,948,351 | 28.71 | 88.25 |
| Revenu net de l'exploitation | 259,297 | 3.82 | 11.75 |
| Autre revenu | 8,799 | 0.06 | 0.17 |
| Revenu net pour la distribution | 263,096 | 3.88 | 11.92 |
| Disposition du surplus: | | | |
| Dividendes | 71,999 | 1.06 | 3.26 |
| Remboursements aux patrons | 37,467 | 0.55 | 1.70 |
| Porté à la réserve | 95,681 | 1.41 | 4.33 |
| Total | 205,147 | 3.02 | 9.29 |
| Revenu non divisé | 57,949 | 0.86 | 2.63 |

pour cent du commerce total. Les ventes de marchandises par ces compagnies, c'est-à-dire d'aliments à bétail, d'engrais chimiques, d'instruments aratoires, etc., ne se monte qu'à \$149,512 soit 2.20 pour cent du total. Les autres recettes, au total de \$63,958, se composent du revenu de l'entrepôt, des crédits, etc., et ne représentent que 0.94 pour cent du total.

Sur cette somme de \$6,573,128 que les compagnies ont tiré de la vente du lait, du beurre et du fromage, les patrons producteurs ont reçu \$4,440,290 ou 68 cents sur chaque dollar des ventes. Des marchandises coûtant \$138,660 ont été vendues aux patrons pour \$149,512 à une marge de profit de 7.8 pour cent. Au total, les compagnies avaient une marge de plus de deux millions ou 32.53 pour cent du chiffre total d'affaires pour payer les frais d'opération. Cette marge variait d'une compagnie à l'autre depuis 40 pour cent jusqu'à 15 pour cent.

Les gages et les salaires sont l'un des plus gros déboursés; ils se montent à 22.79 pour cent des frais totaux. Les taxes et l'assurance combinées prennent moins de un pour cent et les frais de réclame moins de un quart de un pour cent. L'entretien de l'installation représente un montant considérable. Le total des dépenses a été de 88.25 pour cent de la marge brute, laissant une balance de 11.75 pour cent, laquelle, jointe à un autre revenu de 0.17 pour cent tiré de placements, etc., donne 11.92 pour cent soit près d'un huitième de la marge brute qui doit revenir aux producteurs comme remboursement ou comme versement à titre de dividende sur les actions.

TABLEAU 3.—ESSAIS DE "PROPORTIONS RELATIVES" APPLIQUEES AUX OPERATIONS COMBINEES DE VINGT-CINQ COMPAGNIES LAITIERES AU CANADA POUR L'ANNEE 1931.

| | |
|---|------------|
| Actif courant au passif courant | 1.78 à 1. |
| Valeur à la dette | 1.44 à 1. |
| Chiffre d'affaires à la valeur de l'établissement | 5.83 à 1. |
| Valeur nette à l'actif fixe | 1.37 à 1. |
| Proportion pour cent d'argent à l'actif total | p.c. 24.97 |
| Proportion pour cent des dépenses au chiffre d'affaires | p.c. 28.71 |
| Affaires par employé | \$ 15,968 |
| Affaires par patron | \$ 363 |

Toutes ces compagnies suivent le principe coopératif de la distribution des surplus. Dans la plupart des provinces, les lois de l'incorporation règlent la distribution du surplus. Généralement, on ne met pas plus de 10 pour cent du surplus net en réserve jusqu'à ce qu'un montant se soit accumulé, égalant au moins 35 pour cent du capital-actions payé. L'intérêt accordé sur les actions entièrement payées varie de 6 à 8 pour cent. Le reste du surplus est alors divisé entre les patrons et les actionnaires, proportionnellement au chiffre des affaires qu'ils ont faites avec la société.

Distribution du revenu net.—Sur un revenu net, pour distribution, de \$263,096, la somme mise en réserve par ces compagnies était de \$95,681 soit 36.4 pour cent. L'intérêt sur les actions payées détenues par les actionnaires se montait à \$71,999, équivalant à un dividende de 6.5 pour cent. La somme de \$37,467 a été remboursée aux patrons qui ont contribué à l'industrie et le reste, \$57,949, a été laissé au compte du revenu non divisé.

Ces compagnies laitières ont employé au total 425 personnes, y compris la direction et les ouvriers. Les salaires et les gages représentent, pour chaque employé, une moyenne de \$1,183.59 pour l'année. Un facteur intéressant dans cette analyse est le montant d'affaires par employé qui, pour toutes les compagnies, atteint une moyenne de \$15,963. Chez certaines compagnies, ce montant dépasse \$20,000; dans d'autres, il tombe à \$3,000, ce qui porte à croire que le travail n'était pas employé de façon à en obtenir le plein rendement.

Les patrons étaient au nombre de 18,675 et chacun d'eux a contribué en moyenne \$363 d'affaires; ce chiffre varie depuis plus de \$4,000 à moins de \$100. Ces écarts dépendent surtout du degré de spécialisation en industrie laitière parmi les patrons de la beurrerie; pour bien des patrons, l'industrie laitière n'est qu'une industrie annexe de la ferme.

LE COUT DE LA TRACTION MECANIQUE SUR LES FERMES DES PRAIRIES DANS L'OUEST DU CANADA¹

E. G. GREST²

Une bonne partie de l'énergie motrice qui était autrefois fournie par les chevaux dans l'Ouest du Canada est maintenant fournie par des tracteurs de différentes marques et de différentes dimensions. Les chevaux sont toujours la source la plus importante d'énergie motrice et ils le resteront probablement bien des années, mais il y a une place pour les deux genres de traction sur la ferme. La grande difficulté est de bien régler les besoins de la traction à la dimension de la ferme. Il est essentiel pour cela de connaître le coût du tracteur, la dimension de la ferme et le nombre d'heures d'utilisation, etc.

La discussion suivante est basée sur l'analyse du fonctionnement de 256 tracteurs du type moderne qui sont employés pour presque tous les genres de travaux des champs et la transmission d'énergie par courroie sur les fermes de l'Ouest canadien. Ces tracteurs sont classés, pour fins de comparaison, suivant le nombre de charrues qu'ils traînaient sur les fermes visitées. Ceci donne quatre classifications—tracteur à deux charrues, tracteur à trois charrues, tracteur à quatre charrues et tracteur à cinq charrues.

Nous présentons au tableau 1 les détails du coût de fonctionnement par tracteur et par heure. Le combustible employé était en grande partie de la gazoline; il y avait aussi du pétrole et de petites quantités de distillé. Le prix moyen payé pour la gazoline, déduction faite du rabais sur la taxe, était de 27 cents le gallon.

Les frais en argent comptant du fonctionnement du tracteur variaient de 59 à 68 pour cent du coût total du fonctionnement; pour le tracteur à trois charrues, la dimension la plus appréciée, ce chiffre était de 59 pour cent. Les tracteurs à trois charrues ont fonctionné en moyenne 417 heures par année et se trouvaient sur les fermes dont l'étendue moyenne était de 583 acres. Les déboursés en argent comptant étaient de \$336.50 par tracteur et par année, soit une moyenne de 81 cents l'heure. Le total des frais de fonctionnement, qui comprenaient l'intérêt, la dépréciation et l'entretien, se montait à \$574.30 par année, soit \$1.38 l'heure. Le coût moyen par heure pour les principaux comptes était le suivant: combustible 65c.; huile lubrifiante 11c; graisse 1c.; parties et main-d'œuvre pour entretien 6c.; intérêt 12c.; dépréciation 38c. et valeur de l'entretien et de l'ajustage 7c. l'heure.

La quantité de combustible consommé par les tracteurs à trois charrues était de 2.41 gallons l'heure, celle d'huile lubrifiante était en moyenne d'un dixième de gallon par heure. Les chiffres pour les tracteurs des autres dimensions sont consignés au Tableau 1.

Heures d'utilisation et coût par heure.—Le coût par heure des travaux au tracteur est influencé principalement par le nombre d'heures de travail ainsi que le font voir les données présentées au tableau 2. Pour les tracteurs à trois charrues, lorsque le nombre d'heures de travail passait d'une moyenne de 117 par tracteur à 794, le coût par heure diminuait de \$2.31 à \$1.17. De même, une diminution dans le coût de \$2.45 à \$1.47 par heure a été notée pour les tracteurs à quatre charrues. Un montant considérable des frais fixes reste constant, quel que soit le nombre d'heures que le tracteur est employé. Ils forment donc une plus grande proportion du coût total lorsque les tracteurs sont employés pour un petit nombre d'heures. Pour cette raison, il est douteux qu'un tracteur soit jamais un sage placement sur une ferme de l'Ouest

¹ Les données employées dans cet article ont été recueillies au cours de l'été de 1931 dans les districts de Olds, Bow Island, Foremost, Hilda et Irvine dans l'Alberta et dans les districts de Davidson, Craik, Maple Creek et Richmond dans la Saskatchewan. L'étude a été conduite coopérativement par le Comité canadien des problèmes du pionnier, le Service de l'exploitation des fermes de l'Université de la Saskatchewan, l'Université de l'Alberta et la Division de l'économie agricole du Ministère fédéral de l'Agriculture.

Etat préliminaire, sujet à être révisé et corrigé. Ce résumé a été préparé d'après le manuscrit original par L. V. Parker, Adjoint de campagne, Division de l'économie agricole, Ottawa.

² Autrefois adjoint de campagne, Division de l'économie agricole, maintenant inscrit à l'école des diplômés, Université du Minnesota, à titre de fellow de la Saskatchewan Research Foundation.

TABLEAU 1.—FRAIS DE FONCTIONNEMENT DES TRACTEURS PAR TRACTEUR ET PAR HEURE SASKATCHEWAN ET ALBERTA

| Frais pour l'année finissant le 1er avril 1931 | Tracteur | | | | | | | |
|---|-----------------|--------------|-----------------|--------------|-----------------|--------|---------|--------|
| | A 2 charrues | A 3 charrues | 4 charrues | 5 charrues | | | | |
| Nombre de tracteurs..... | 23 | 149 | 77 | 7 | | | | |
| Nombre moyen d'heures au travail 1930..... | 246 | 417 | 482 | 386 | | | | |
| Valeur moyenne..... | \$373 | \$842 | \$984 | \$831 | | | | |
| Dimension moyenne de la ferme, acres cultivés..... | 376 | 583 | 706 | 771 | | | | |
| | Par tracteur | Par heure | Par tracteur | Par heure | Par tracteur | | | |
| Gallons de combustible consommé..... | | 1.90 | | 2.41 | | 2.84 | | 3.21 |
| Coût du combustible..... | | \$0.51 | | \$0.65 | | \$0.77 | | \$0.89 |
| Gallons d'huile à cylindre..... | | 0.08 | | 0.10 | | 0.12 | | 0.21 |
| Coût de l'huile à cylindre..... | | \$0.09 | | \$0.11 | | \$0.16 | | \$0.24 |
| Coût de la graisse..... | | \$0.01 | | \$0.01 | | \$0.01 | | \$0.02 |
| Parties, plus main-d'œuvre louée pour réparations ¹ | | \$0.06 | | \$0.04 | | \$0.06 | | \$0.22 |
| | \$ | \$ | \$ | \$ | \$ | \$ | \$ | \$ |
| Total des déboursés comptants..... | 166.0 | 0.67 | 336.5 | 0.81 | 479.6 | 0.99 | 529.4 | 1.37 |
| Intérêt à 6%..... | 22.4 | 0.09 | 50.5 | 0.12 | 59.1 | 0.12 | 49.9 | 0.18 |
| Dépréciation..... | 78.0 | 0.32 | 132.7 | 0.38 | 190.9 | 0.40 | 163.7 | 0.42 |
| Valeur de l'entretien et, ajustage..... | 11.5 | 0.05 | 27.6 | 0.07 | 32.5 | 0.07 | 37.0 | 0.10 |
| Heures d'entretien et d'ajustage..... | 33.9 | 0.14 | 67.7 | 0.16 | 78.2 | 0.16 | 65.6 | 0.17 |
| Total des frais de fonctionnement..... | \$277.9 | \$1.13 | \$574.3 | \$1.38 | \$762.1 | \$1.58 | \$780.0 | \$2.02 |
| Pourcentage des déboursés comp- tants relativement au total..... | | 59 | | 59 | | 62 | | 68 |

1 La main-d'œuvre louée pour les réparations équivaut à $\frac{1}{2}$ c. par heure pour les tracteurs à deux, trois, et quatre charrues et à quatre cents par heure pour les tracteurs à cinq charrues.

TABLEAU 2.—HEURES DE TRACTION PAR AN EN RELATION AU COUT TOTAL DES
TRACTEURS EN FONCTIONNEMENT PAR HEURE

| Heures de traction par an | Tracteur | | | | | |
|------------------------------|------------------|----------------------------------|-----------------------------------|-------------------|----------------------------------|-----------------------------------|
| | A trois charrues | | | A quatre charrues | | |
| | Nombre | Moyenne heures de traction | Coût de l'énergie par heure | Nombre | Moyenne heures de traction | Coût de l'énergie par heure |
| 1 - 199 | 34 | 117 | \$2.31 | 8 | 148 | \$2.45 |
| 200 - 399 | 47 | 305 | 1.59 | 25 | 324 | 1.76 |
| 400 - 599 | 33 | 484 | 1.30 | 24 | 507 | 1.52 |
| 600 et plus | 35 | 794 | 1.17 | 20 | 781 | 1.47 |
| Tous tracteurs | 149 | 417 | 1.38 | 77 | 482 | 1.58 |

du Canada, à moins qu'il n'y ait, sur la ferme, de quoi l'employer 500 heures au moins à un travail utile.

Dimension de la ferme et heures d'emploi du tracteur.—La question de savoir de quelle grandeur une ferme devrait être pour fournir 500 heures de travail utile pendant l'année dépend de la proportion de travaux de culture exécutés par un tracteur et

aussi de l'intensité de l'exploitation. Si l'on suppose que les tracteurs font tous les travaux des champs, on trouve que la dimension de la ferme nécessaire pour permettre un emploi économique du tracteur est la suivante:— tracteur à deux charrues—une moitié à trois quarts de section en supposant que chaque quart de section couvre de 140 à 150 acres de terre en culture; tracteur à trois charrues—trois quarts à une section et un quart; tracteurs à quatre charrues, une à une section et demie. Si l'on se sert de chevaux en même temps que de tracteurs, alors il faut compter dans la superficie qui précède de 30 à 50 acres de terre en culture par cheval.

TABLEAU 3.—COUT DES DIFFERENTES OPERATIONS DE CULTURE AU MOYEN D'UN TRACTEUR A 3 CHARRUES.

| | Labour de prin- temps et d'automne | Binage | Semaines | Dis- quage double | Hersage | Coupe |
|---|---|-------------|-------------|-------------------------|-------------|-------------|
| Nombre de machines..... | 86 | 25 | 32 | 93 | 15 | 21 |
| Dimension ordinaire des machines | 3-14" G | 12' | 14' | 10' T | 32' | 10' |
| Acres par heure de machine..... | 1.24 | 3.66 | 4.22 | 3.21 | 9.90 | 3.01 |
| | \$ | \$ | \$ | \$ | \$ | \$ |
| Coût moyen par acre 1930: | | | | | | |
| Coût de la traction..... | 1.12 | 0.38 | 0.33 | 0.43 | 0.14 | 0.46 |
| Coût de la main-d'œuvre..... | 0.33 | 0.11 | 0.09 | 0.13 | 0.04 | 0.22 |
| Coût total..... | 1.45 | 0.49 | 0.42 | 0.56 | 0.18 | 0.68 |
| | \$ | \$ | \$ | \$ | \$ | \$ |
| Coût moyen évalué par acre 1932: | | | | | | |
| Coût de la traction..... | 1.12 | 0.38 | 0.33 | 0.43 | 0.14 | 0.46 |
| Coût de la main-d'œuvre | 0.22 | 0.07 | 0.06 | 0.09 | 0.03 | 0.14 |
| Coût total..... | 1.34 | 0.45 | 0.39 | 0.52 | 0.17 | 0.60 |

Coût des travaux par acre.—Le coût de l'exécution de quelques-uns des principaux travaux des champs avec un tracteur à trois charrues est présenté au tableau 3. Voici quels ont été les frais par acre en 1930: labours \$1.45, scarifications 49 cents, semaines 42 cents, disqueage double 56 cents, hersage 18 cents et coupe 68 cents. En 1932 il y a eu une réduction d'environ 33 pour cent dans les frais de main-d'œuvre mais les frais de fonctionnement sont restés les mêmes qu'en 1930. Le tracteur à trois charrues était le genre de machine le plus employé, et il a exécuté en moyenne les travaux des champs aussi économiquement que le tracteur à quatre charrues et à meilleur compte que le tracteur à deux charrues. En théorie, le tracteur à quatre charrues devrait faire les travaux plus économiquement parce qu'il économise sur les frais de main-d'œuvre par acre, mais dans bien des cas la traction s'exerçait sur des instruments de dimension recommandée pour des tracteurs à trois charrues. Les tracteurs de toutes les dimensions n'étaient généralement pas assez chargés et il en résultait un emploi peu économique de la force motrice.

Comparaison avec le coût de l'énergie chevaline.—On a constaté en 1930 que les frais d'exécution des principaux travaux de culture étaient moins élevés avec les tracteurs qu'avec les chevaux, mais en 1932, il y avait eu une telle diminution dans les prix des aliments et de la main-d'œuvre tandis que les frais des tracteurs restaient à peu près les mêmes, que l'énergie chevaline était beaucoup plus économique que celle des tracteurs. En règle générale le coût total de l'exécution des travaux de la ferme avec les chevaux est moins élevé qu'avec les tracteurs lorsqu'il faut plus de deux boisseaux d'avoine pour acheter assez de combustible pour faire fonctionner un tracteur à trois charrues pendant une heure.

OUVRAGES ECONOMIQUES

RUSSEL, SIR E. JOHN. *THE FARM AND THE NATION.* George Allen and Urwin Limited, Publishers, Museum Street, Londres, 1933, p. 240.

L'auteur de ce livre, Sir E. John Russell, est directeur de la Station Agronomique de Rothamstead. Cet ouvrage offre un intérêt direct pour les gens au Canada ainsi qu'en Grande-Bretagne qui s'intéressent aux problèmes agricoles et aux initiatives tentées pour les résoudre.

Le premier chapitre du livre est intitulé "Les vivres de la nation, d'où viennent-ils?" Nous y trouvons cette question "Est-ce là le meilleur moyen d'utiliser notre richesse nationale, ou ne ferions-nous pas mieux de produire plus de ces vivres nous-mêmes?" Les chapitres suivants répondent à la question.

Le chapitre II donne un résumé des "Hauts et des bas de l'agriculture britannique". L'auteur présente une revue historique de la tendance agricole britannique depuis les premiers temps jusqu'à nos jours. Dans le chapitre III "Notre terre arable, comment nous l'employons", l'auteur donne une description intéressante des régions agricoles de la Grande-Bretagne, des types de sols, de la topographie, des changements historiques et de l'utilisation actuelle de la terre.

"Le résultat de nos efforts agricoles" forme la base de la discussion dans le chapitre IV. Les trente millions d'acres de terre cultivée en Grande-Bretagne, joints aux fourrages importés, produisent quarante pour cent des vivres nécessaires pour quarante-cinq millions d'hommes ($1\frac{1}{3}$ acre, plus les fourrages importés, nourrissent une personne).

Les chapitres V et VI traitent de l'Empire comme source de vivres, et de la possibilité d'augmenter la part de l'Empire dans le total des importations. Sur les 60 pour cent des vivres importés, l'Empire fournit 21 pour cent et les pays étrangers 39 pour cent. Résumant les constatations des chapitres V et VI l'auteur dit, "Nous pourrions, sans difficulté, nous ravitailler entièrement dans les pays britanniques pour le lait, les pommes de terre, le mouton, l'agneau et le fromage . . . Pour le pain et les fruits, nous nous suffirions presque à nous-mêmes, mais peut-être pas tout à fait . . . pour le boeuf, le bacon, le beurre et les oeufs, il serait difficile, mais non pas impossible de se suffire." Mais la question se pose "Devrions-nous prendre les mesures nécessaires pour leur (les pays étrangers) fermer nos marchés?"

Quelques-unes des difficultés du cultivateur sont présentées au chapitre VII. En agriculture, la production est lente et ne peut être hâtée; c'est pourquoi il est difficile de la régler suivant les changements de prix. Les cultivateurs souffrent d'une baisse de prix parce qu'ils ne peuvent modifier leurs opérations assez vite. On ne peut pas non plus faire face à une baisse de prix en réduisant les salaires, car la loi du salaire minimum s'y oppose.

Le chapitre VIII discute les moyens d'utiliser les terres arables de la Grande-Bretagne. Enfin, dans le chapitre IX l'auteur traite de la question du remplacement des hommes par les machines en agriculture.

L'auteur conclut en disant qu'il y aurait trois moyens de traiter l'agriculture britannique: "(1) l'organiser pour la production de la plus grande quantité de nourriture possible, tirée de notre propre sol; (2) l'organiser pour fournir du travail aux hommes supplantés par les méthodes modernes et par les machines; (3) la laisser lutter du mieux qu'elle le peut contre les importations non restreintes de vivres venant d'outre-mer, le cultivateur étant entièrement libre de gagner le bénéfice qui peut revenir à ceux qui travaillent sur la terre, quelle que soit la somme totale de richesse produite."

"Ces trois propositions, entièrement distinctes, sont en somme incompatibles . . . La production d'une quantité maximum de vivres nous oblige à protéger le cultivateur contre les risques de baisses de prix pendant la période de développement." Ceci

comporte un système de contrat, avec prix convenus, ou un système de contingement. "Le résultat des importations sans restriction d'outre-mer est d'obliger les cultivateurs à réduire les frais de production, et ils le font en réduisant la main d'oeuvre. Jusqu'à ces tout derniers temps, les hommes ainsi supplantés émigraient ou trouvaient du travail dans les villes. En regard de l'économie dans le cas de la nourriture de ces hommes remplacés, il faut mettre le coût de leur entretien, dans l'oisiveté ou dans des travaux non productifs."

"Il est possible au moyen de petites propriétés et des fermes de familles de trouver du travail pour quelques-uns de ces hommes qui sont sortis de l'agriculture et de l'industrie. On équilibrerait ainsi tant soit peu l'exode des cultivateurs causée par l'extension des propriétés et le machinisme. Mais ces petites fermes sont coûteuses à établir, difficiles à exploiter et elles exigent de plus longues heures et un travail plus dur pour l'opérateur et sa famille. Il y aurait moyen d'établir sur les terres des groupements qui se suffiraient à eux-mêmes et qu'on munirait de machines modernes pour leur éviter ces difficultés"

"Le choix entre ces différentes alternatives devrait être fait rapidement et de façon définitive. Le problème ne fera qu'empirer avec le temps."

NOTES

Un bulletin du Service du recensement, du Bureau fédéral de la Statistique, basé sur le recensement de 1931 montre que les nombres d'ouvriers et d'ouvrières agricoles à gages en 1931 étaient respectivement de 197,204 et de 1,800. Les salaires moyens de ceux qui ont fait rapport étaient de \$319 par an pour les hommes et de \$275 pour les femmes. Les hommes ont été employés en moyenne 43.56 semaines par année, les femmes 43.83 semaines. La moyenne des salaires pour les hommes employés dans toutes les industries était de \$927 par an, pour les femmes, de \$560. Les hommes étaient en moyenne employés 41.12 semaines et les femmes 46.59 semaines en 1931.

* * *

A une réunion récente tenue à Regina, il a été décidé de faire envoyer par les municipalités et les comités locaux des pools du blé et du bétail, des questionnaires pour se renseigner sur les quantités de fourrages qui seront nécessaires dans les régions affectées par la sécheresse avant que l'on prenne des mesures pour fournir des fourrages supplémentaires. Des représentants des pools du blé et du bétail, de l'Association des municipalités rurales de la Saskatchewan, de la Commission du Secours, et du Ministère provincial de l'Agriculture à Regina, assistaient à cette réunion. On a discuté également le rapport de ce qui a déjà été fait pour fournir des fourrages aux régions affectées.

* * *

Les officiers de la Société canadienne de l'économie agricole pour 1933-34 sont les suivants: Président—Dr. W. V. Longley, Collège d'agriculture, Truro, Nouvelle-Ecosse; Vice-Président, H. C. Bois, Division de l'économie rurale, Ministère de l'Agriculture, Québec, P.Q.; Secrétaire, J. Coke, Division de l'économie, Ministère de l'Agriculture, Ottawa; Comité exécutif: Dr. T. W. Grindley, Bureau fédéral de la Statistique, Ottawa, Dr. W. Allen, Université de la Saskatchewan, Saskatoon, H. R. Hare, Association des producteurs de lait des terres basses de l'intérieur, Vancouver, F. W. Reinoehl, Colonization Finance Corporation, Winnipeg.

* * *

Dans un article paru dans "The Lighter", du 16 septembre, au sujet du tabac canadien au Royaume-Uni, M. T. J. Major, Service du tabac, Ferme expérimentale centrale, Ottawa, dit ce qui suit: "En somme, la situation est assez satisfaisante, mais il est important au plus haut point que l'on évite la surproduction. Ce n'est que par

un développement lent, graduel, basé sur un produit de qualité toujours meilleure, que l'on parviendra à établir un débouché permanent pour le tabac canadien sur les marchés des vieux pays."

* * *

MM. A. Gosselin, Division de l'économie, Ministère de l'Agriculture, Ottawa, et R. Lécuyer, Division de l'économie rurale, Ministère de l'Agriculture, Québec, ont terminé les travaux de campagne dans une étude sur le prix de revient des pommes dans le Québec. Ils se sont procuré également des renseignements sur le coût du développement d'un verger jusqu'à l'âge de rapport.

* * *

Les quantités de blé consignées pour l'exportation pendant la semaine finissant le 29 septembre, ont été moins considérables que la semaine précédente et d'environ 3,000,000 de boisseaux inférieures à celles de la même semaine l'année dernière. Il y avait en entrepôt, au 29 septembre, 226,218,782 de boisseaux de blé canadien tandis que la quantité entreposée pendant la même semaine en 1932 était de 198,239,902 boisseaux.

* * *

La Commission de stabilisation de l'Okanagan a été formée pour diriger la vente des fruits en Colombie-Britannique pendant la saison de 1933-34. Le Major M. V. MacGuire, qui était gérant du Comité du Cartel qui a fonctionné l'année dernière, est gérant pour le nouveau comité.

* * *

Andrew Fulton, Représentant commercial de l'Association des producteurs de fruits de l'Ontario, fait rapport que les poires Bartlett de l'Ontario se vendent aisément sur les marchés anglais. Les mannes de 2-2½ ont fait 12/- à 14/6 et quelques demi-barils, contenant 96 livres de fruits, ont obtenu 20/-.

* * *

The Ontario Milk Producer, septembre, 1933, signale les prix suivants obtenus pour le lait dans les villes d'Ontario: St. Catharines et Niagara Falls \$1.81 le qt1.; Toronto, Hamilton et Oshawa \$1.81; Kitchener \$1.40; London \$1.00 (a monté depuis à \$1.40); St. Thomas \$1.55; Sarnia \$1.30; Windsor \$1.40.

* * *

Le premier paiement pour le blé vendu en commun sera de 45c. le boisseau à Fort William, d'après un rapport que vient de publier la Direction du pool du blé de la Saskatchewan.

* * *

La Coopérative des ventes du bétail de l'Île du Prince-Edouard a été organisée le 1er août. Une constitution a été adoptée par le Bureau des Directeurs. La nouvelle organisation recevra les expéditions de 28 clubs sur l'Île.

* * *

Une corporation a été organisée sous l'administration du règlement agricole pour acheter le surplus des produits de la ferme et les distribuer à 3,500,000 familles qui sont actuellement sur les listes du secours aux Etats-Unis. On dit que les fonds pour ces achats seront pourvus par les taxes de fabrication, les subsides accordés sous la Loi fédérale d'urgence de 1933 et la Corporation de reconstitution.

NOTES ET NOUVELLES

UNE SECTION ECONOMIQUE TRIMESTRIELLE DANS LA REVUE AGRONOMIQUE

A commencer avec le présent numéro, *l'Economiste Agricole*, revue s'occupant du côté commercial de l'agriculture publiée par la Division d'Economie Agricole du Ministère fédéral de l'Agriculture, paraîtra chaque trimestre comme une section de la *Revue Agronomique*. Cette publication trimestrielle sera faite en français aussi bien qu'en anglais. Des compressions budgétaires, en supprimant les fonds réservés à la publication de *l'Economiste Agricole* par la Division d'Economie Agricole, empêchent sa publication pendant les mois d'été et les pages que l'on trouvera dans le présent numéro remplacent les numéros 7, 8 et 9, juillet à septembre. Des réponses extrêmement favorables à un questionnaire envoyé à tous ceux dont le nom figurait sur la liste d'envoi justifie l'effort fait par la Division d'Economie pour continuer la publication sous une forme ou sous une autre. Il faut espérer que les arrangements faits pour publier l'ancien *Economiste* comme une partie de la *Revue Agronomique* seront à l'avantage réciproque des deux publications.

Pour ceux qui ne sont pas familiers avec *l'Economiste Agricole* tel qu'il paraissait, il n'est pas inutile d'expliquer que cette revue consistait principalement en articles rapportant le travail de la Division d'Economie Agricole. Le présent numéro contient une étude de M. J. Coke sur le contrôle gouvernemental des marchés en prenant comme démonstration la valorisation du café au Brésil. M. A. E. Richards présente de la documentation sur les affaires des sociétés coopératives laitières et M. E. G. Grest donne un rapport sur le coût d'opération des tracteurs dans l'Ouest canadien. Des nouvelles d'actualités et des revues sur la littérature économique courante trouvent aussi une place régulière dans l'Economiste.

ANALYSE ECONOMIQUE MENSUELLE

La section intitulée "La Situation Economique" présentera de l'intérêt pour tous les techniciens agricoles. Cette section donne une interprétation prise au point de vue agricole des nombres-indices annuels et mensuels computés par le Bureau fédéral de Statistique en ce qui concerne les prix et la production. Le tableau contenu dans le présent numéro donne les moyennes annuelles de 1913 à 1932 et les moyennes mensuelles pour l'année en cours. Cette section de *l'Economiste* sera préparée mensuellement pour la *Revue Agronomique* par la Division d'Economie. Les membres de la C.S.T.A. trouveront donc dans leur revue une analyse mensuelle de la situation agricole et une section trimestrielle d'études sur des sujets économiques intéressants.

EMPLOI DES NOMBRES-INDICES

Le progrès des sciences physiques et biologiques est dû pour une part considérable au développement des méthodes de mesure des divers phénomènes. La science économique a souffert de la difficulté qu'il y a à mesurer exactement les phénomènes hautement dynamiques dont elle essaie de formuler les lois. L'emploi général des nombres-indices des variations dans les prix et la production, en temps que système de mesure reconnu, date à peine du commencement du siècle présent, et leur emploi dans les journaux et les périodiques populaires est un développement d'après guerre. Il est cependant évident qu'ils sont destinés à devenir une part de nos conversations journalières dans un avenir rapproché. Il est possible que d'ici à quelques années ils forment la base d'évaluation de la valeur-or de la monnaie, remplaçant l'évaluation basée sur la valeur marchande de l'or lui-même. Un tel système est déjà en application en Suède et dans quelques autres pays d'Europe où les prix sont maintenus constants au niveau désiré.

Il nous sied donc de nous familiariser avec les nombres-indices. Warren et Pearson dans leur livre "Les Prix" définissent ainsi les nombres indices:

“Il est difficile de comparer directement les prix de commodités différentes. Si le blé vaut un dollar par boisseau et la café 10 cents par livre, on est obligé de comparer ces prix à des prix précédents avant de pouvoir juger lequel est relativement élevé ou relativement bas. Le prix du blé peut être comparé aux prix du blé pendant une période antérieure sur une base de pourcentage, et de même le prix du café peut être comparé à des prix antérieurs. Si le prix du blé est 90% du prix précédent et le prix du café 110 pour cent du prix précédent, ce chiffre de 90 peut être comparé au chiffre de 110. Ces deux chiffres représentent des nombres-indices des prix des deux produits.

“Si l'on obtient des nombres-indices pour plusieurs produits et qu'on en fasse la moyenne, il devient possible de juger le niveau général des prix. Par exemple le Bureau américain de Statistique publie un nombre-indice du prix de gros de 784 produits. Les prix de gros en 1920 étaient plus du double de la moyenne de ceux des cinq années d'avant la guerre, mais en 1932 les prix étaient au-dessous du niveau d'avant guerre. D'ordinaire le meilleur moyen de juger le prix d'un produit particulier est de le comparer au niveau général des prix représenté par un nombre-indice tel que celui donné ci-dessus. Par exemple en juin 1932 le nombre-indice pour tous les produits était de 93%. Le nombre-indice du prix de blé sur la ferme était 41; celui du coton 36. Comparés à d'autres choses, le blé et le coton étaient très bon marché.”

Maints lecteurs qui ont accepté l'idée que les nombres-indices représentent un système standard de mesure et d'observation des phénomènes économiques sont quelque peu troublés de voir les économistes changer l'année de base pour satisfaire ce qui semble être leur propre commodité. La tendance pour la plupart d'entre nous est d'utiliser les années ayant immédiatement précédé la guerre comme base à laquelle rapporter les problèmes d'ordre social ou économique. Nous aimons donc voir nos tableaux de nombres-indices prendre pour valeur 100 l'année 1913, ou la moyenne des cinq années 1910-1914. Nous considérons que cette période représentait “la normale” et nous nous demandons si nous avons jamais été normaux depuis.

Il y a cependant des difficultés à baser toutes les tables sur les années d'avant guerre. En 1929 le Bureau fédéral de Statistique a revisé tous ses indices en prenant 1926 comme année de base. Certains calculs remontant aussi loin que 1867, faits sur la base 1913, ont été refaits dans un but historique. Une des principales raisons pour prendre comme année de base une année d'après guerre est que le nombre des séries pour lesquels le Bureau obtient les prix de gros a augmenté de 236 en 1913 à 502 en 1926. La plus grande diversité des produits et le changement considérable dans leur importance relative obtenus dans les séries de 1926, donnent une image beaucoup plus exacte de la situation des prix que des nombres-indices basés sur 236 commodités telles que produites en 1913.

Le niveau des prix pour l'année 1926 étant pratiquement équidistant des niveaux de 1925 et 1927 correspond environ à la moyenne de 1925, 1926 et 1927. Une autre raison pour adopter 1926 est que le Bureau américain de Statistique emploie cette même année pour ses indices des prix de gros de 784 commodités. Ceci facilite l'étude des mouvements des prix dans les deux pays.

IMPORTANCE D'UNE DOCUMENTATION ECONOMIQUE EXACTE

Nous espérons que l'inclusion régulière de *l'Economiste Agricole* dans la *Revue Agronomique* rencontrera l'approbation de nos membres et souscripteurs. Depuis longtemps ceux de nos membres engagés dans le vulgarisation ou dans des entreprises commerciales demandent des articles d'ordre plus pratique. En même temps, tous les membres étant d'accord pour que nous ne fassions pas de journalisme agricole au sens ordinaire du terme, il a été difficile de satisfaire la demande.

C'est notre impression que l'inclusion du matériel économique décrit ci-dessus intéressera tous les membres de la C.S.T.A. Nous sommes fiers de dire au Canada que nos hommes de recherche ne se sont pas éloignés des problèmes immédiats et fondamentaux des cultivateurs. En fait, il y a peu de nos savants qui ne soient en contact personnel avec des cultivateurs et des étudiants fils de cultivateurs. Il n'est

pas suffisant que nos techniciens agricoles soient à même de répondre à des questions se rapportant à leurs diverses spécialités. Tous, sinon comme économistes, au moins comme citoyens éduqués et informés, nous avons à exprimer notre opinion sur les problèmes économiques courants et la façon dont ils affectent les cultivateurs. Ces questions nous sont posées par des cultivateurs au cours de conversations qui n'ont rien de formel, d'homme à homme, notre position officielle étant entièrement laissée de côté. C'est souvent le moment où des directives peuvent être données avec le plus de chances de succès. Pour qu'elles vaillent quelque chose, il faut cependant que ces directives soient basées sur quelque chose de plus substantiel que la lecture de la presse quotidienne. Les pages économiques de la *Revue Agronomique* fourniront à nos lecteurs une base d'information précise avec laquelle ils trouveront certainement avantage à se familiariser pour comprendre et juger les questions économiques qui s'imposeront chaque jour davantage à leur attention.

RESUME DES ARTICLES PUBLIES EN ANGLAIS DANS CE NUMERO

EFFET DE QUELQUES ENGRAIS CHIMIQUES SUR LA COMPOSITION BOTANIQUE ET LE RENDEMENT DES PRAIRIES PERMANENTES. F. S. Nowosad, Macdonald College, McGill University, P.Q.

Des prairies permanentes de la région de Cowansville, P.Q., ont été utilisées pour mesurer l'influence de l'azote, du phosphore et de la potasse, seuls ou en combinaison, avec ou sans chaux. Les expériences ont été conduites en 1931 et 1932. La chaux a donné un surplus de rendement important dans une série de parcelles et une diminution importante dans une autre série. Le phosphore, la potasse et l'azote ont augmenté le rendement partout où on les a appliqués. La première année, des accroissements importants ont été obtenus dans les parcelles recevant les traitements Ca N.P.K., N P K, Ca P K, P. K. et Ca P. La seconde année seule l'application complète Ca N P K a donné un accroissement important. Il semble que la seconde année les différences entre les diverses parcelles n'aient pas été aussi grandes que la première année.

Bien que l'influence des traitements sur la composition botanique ne soit pas encore absolument définie, il semble que les traitements aient une influence sur la proportion des diverses espèces. Lors de la première expérience la chaux a augmenté le pourcentage d'herbes utiles et diminué les mauvaises herbes, la mousse et l'espace dépourvu de végétation. Le superphosphate a augmenté le trèfle les deux années. Les autres éléments n'ont pas eu de résultats importants. Dans la seconde expérience, la chaux a augmenté le pourcentage d'herbes et réduit le pourcentage de trèfle. Le superphosphate et la potasse ont augmenté la proportion de trèfle. L'azote a réduit la proportion de trèfle et augmenté le nombre de mauvaises herbes. L'analyse botanique semble être indispensable pour obtenir une interprétation correcte des résultats d'expérience.

TRAITEMENT DES SEMENCES CONTRE LA JAMBE NOIRE DES POMMES DE TERRE. John Tucker et E. W. Harber, Ministère de l'agriculture, Ottawa, Ont.

Les auteurs donnent les résultats de rapports obtenus sur 45,000 champs pendant une période de 5 années, comparant l'infection par la jambe noire dans les champs plantés avec de la semence non traitée et dans les champs plantés avec de la semence traitée au bichlorures de mercure ou à la formaline. Les deux méthodes réduisent les pertes dues à la jambe noire, mais en raison de leur coût elles ne sont pas à recommander, sauf pour les sols présentant des conditions particulièrement favorables au développement de la maladie.

Wilfred Sadler

1883 - 1933

Wilfrid Sadler—born in Cheshire, England, and the son of James Sadler, O.B.E., etc., who for many years has been prominent in agricultural and dairy organization work in Great Britain—came to Canada in the year of 1912. From a minor position as assistant in Bacteriology at McGill (Macdonald College) he gradually and deservedly advanced to become Professor and Head of the Department of Dairying at the University of British Columbia.

The subsequent concentrated data regarding Professor Sadler's degrees, appointments and publications suggest, in part at least, the tremendous scope of his activities. But they do not and cannot indicate the quality of the brain which directed these activities, nor the beauty of the character of the man. That quality and that beauty were revealed in a large measure to those among us who were privileged to work with or for this remarkable genius.

We loved him for his personal charm and his humorous whimsicality; we admired his power of concentration and his extreme patience in detail work. Students and colleagues alike took pride in his achievements and in being associated with, and listening to, a scientist of outstanding qualities, an orator of great ability, a teacher of unusual perception and captivating methods of presentation, and a friend and counsellor of wide experience coupled with a sympathetic heart.

P.A.B.

Degrees: N.D.D., University of Reading, England, 1906; B.S.A., McGill (Macdonald College), 1915; M.Sc. (Gold medalist), McGill, 1917; Winner of International Education Board Fellowship (Rockefeller Foundation) enabling him to undertake special studies in Denmark and Sweden under Orla-Jensen and Barthel, 1926-27.

Appointments: Local Dairy Instructor in various English counties, 1907-10; Assistant and Lecturer at Midland Agr. and Dairy College, Kingston, Derbyshire, 1910-12; Assistant in Bacteriology at McGill (Macdonald College), 1912-13 and 1915-18; Instructor in Dairying at McGill, 1916-17; Associate Professor of Dairying at the University of British Columbia, 1918-21; Professor *ibidem* 1921-33.

Publications: TEXTBOOK: *Bacteria as Friends and Foes of the Dairy Farmer.* BULLETINS: Devonshire Clotted Cream; Bacterial Soft Rot of Turnips; The Bacteriology of Swelled Sardines; The Milk Supply of Montreal (with F. C. Harrison and A. Savage); The Grading of Butter and the Bacterial Content of the Same; The Spoiling of Milk (with Marion Mounce); On the Producing of Milk having a Low Bacterial Content, etc. PAMPHLETS AND MONOGRAPHS: The Kingston Cheese (with Alec Todd); A Note on an Organism producing a Burnt Milk Taste; The Production of a "Caramel" Odour and Flavour in Dairy Products by *Streptococcus Lactis* (Lister); Further Data on the *Streptococcus Lactis* Strain that produces "Caramel" Odour and Flavour in Dairy Products; Flavour Defects in High Grade Milk; Bacteria and Flavours; Coli Types and Ropy Milk (with J. D. Middlemass); Feed Flavor or Stable Odor in Milk caused by an Atypical Strain of *Aerobacter Oxytum*; A Slime-Producing Organism from Water; The Discoloration of Halibut (with F. C. Harrison); Bacteria as affecting the Colour of Paper-Pulp (confidential report); A Preliminary Study of the Bacterial Content of Cheshire Cheese; The Classification of Certain Organisms isolated from Cheshire Cheese (with Orla-Jensen); Cheese Ripening Studies (with Blythe A. Eagles); Nitrogen Distribution in Kingston Cheese-Ripening, Nitrogen Requirements of Lactic Acid Bacteria (Parts I, II and Continuation); The Casein-Splitting Properties of Starters (with Chr. Barthel); Casein-Splitting Abilities of Lactic Acid Bacteria (with Blythe A. Eagles), etc.

NOTES AND NEWS

NEW FEATURE FOR SCIENTIFIC AGRICULTURE QUARTERLY ECONOMIC SECTION

Commencing with the present issue, *The Economic Annalist*, a review of agricultural business prepared by the Agricultural Economics Branch of the Dominion Department of Agriculture, will appear as a quarterly feature in *Scientific Agriculture*. Curtailment of funds available for the maintenance of *The Economic Annalist* as a monthly publication of the Agricultural Economics Branch forced its discontinuance during the summer months, and the present issue takes the place of Nos. 7, 8 and 9 covering July to September. An exceedingly appreciative response to a questionnaire sent out to those whose names were on the mailing list justified the Economics Branch in making an effort to continue publication in some form. A suitable arrangement for publication as a part of *Scientific Agriculture* has been worked out which, it is hoped, will be mutually advantageous.

For those who are not familiar with *The Annalist* as it formerly appeared, it should be pointed out that it consists principally of material reporting the work of the Agricultural Economics Branch. This issue contains a study by Mr. J. Coke on government market control as demonstrated by coffee valorization in Brazil. Mr. A. E. Richards presents information on the business of co-operative dairy companies, and Mr. E. G. Grest reports on the cost of tractor operation in Western Canada. News items and reviews of current economic literature also have a regular place in *The Annalist*.

MONTHLY ECONOMIC ANALYSIS

An additional feature which should be of interest to all technical agriculturists is the section entitled "The Economic Situation." This consists of an interpretation from an agricultural point of view of annual and monthly index numbers of prices and production computed by the Dominion Bureau of Statistics. The table in this section gives the yearly averages from 1913 to 1932 and the monthly averages for the current year. This section of *The Annalist* will not only appear quarterly, but will be prepared monthly for *Scientific Agriculture* by an officer of the Economics Branch. Consequently, members of the C.S.T.A. will receive in their journal a monthly analysis of the agricultural situation and a quarterly section of short papers on pertinent economic topics.

THE USE OF INDEX NUMBERS

The progress of both the physical and biological sciences has depended to a considerable degree upon the application of refined methods of measurement to the phenomena recorded. The science of economics has suffered from the difficulty of accurately measuring the highly dynamic material from which it must formulate its laws. The extensive use of index numbers as an accepted system of measurement of changes in price and production can hardly be said to date back to the opening of the present century, and their use in newspapers and popular periodicals is a post-war development. That they will become part and parcel of our everyday conversation in the near future is quite apparent. It is possible that within a few years they may form the basis of the valuation of the gold content of currency, replacing the less stable valuation based on the market price of gold itself. Such a system is already in effect in Sweden and some other European countries where average prices are held steady at the desired level.

It behooves us, then, to "know our index numbers." Warren and Pearson in *Prices* define index numbers as follows:

"It is difficult to compare prices of different commodities directly. If wheat is \$1.00 a bushel and coffee 10 cents a pound, one must make compari-

son with previous prices before he can judge which of these is relatively high or low. The price of wheat may be compared with wheat prices for a previous period on a percentage basis, and similarly coffee prices may be compared with previous prices. If the wheat price is 90 per cent. of the previous price and coffee 110 per cent. of the previous price, the 90 may be compared with 110. These figures represent index numbers for prices of these two products.

If index numbers are obtained for many commodities, and averaged, it is possible to judge the general price level. For example, the United States Bureau of Labor Statistics publishes an index number of wholesale prices of 784 commodities. Wholesale prices in 1920 more than doubled when compared with the five-year average before the war, but by 1932 were below the pre-war level. Usually the best way of judging the price of a particular commodity is to make comparison with the general price level as represented by some such index number as the one given above. For example, in June 1932, the index number for all commodities was 93. The index of the farm price of wheat was 41; of cotton, 36. Compared with other things, wheat and cotton were very cheap."

Many readers who have accepted the idea that index numbers represent an effort to provide a standard system of measurement for observing economic phenomena are somewhat disturbed to find the economist shifting the base year to suit what appears to be his own convenience in making up his tables. The tendency of many of us is to use the years immediately preceding the Great War as the base for our thinking on social and economic problems. Hence we like to see tables of index numbers based on 1913 as 100, or based on the five-year period 1910-14. We feel that this period represented "normalcy", and we doubt if we have ever been normal since.

There are, however, difficulties in basing all tables on pre-war years. In 1929 the Dominion Bureau of Statistics revised their indexes, using 1926 as the base year. Certain calculations going back as far as 1867 were also shown on the 1913 base for historical and comparative purposes. One of the main reasons for shifting the base to a post-war year was that the number of wholesale price series compiled by the Bureau had increased from 236 in 1913 to 502 in 1926. The wider range of products and the considerable change in their comparative volume or "weight" in the 1926 series gives a much more accurate picture of the price situation in a given year than do index numbers based on 236 commodities as they were produced in 1913. The price level for the year 1926 was about halfway between that for 1925 and 1927, and hence, the base year, 1926, is practically equivalent to the average of 1925, 1926, and 1927. Another reason for taking 1926 was that the United States Bureau of Labor Statistics in their index of wholesale prices of 784 commodities uses the same year. This makes it easier to study the close inter-relation of price movements in the two countries.

SOUND ECONOMIC INFORMATION ESSENTIAL

It is hoped that the inclusion of *The Economic Annalist* as a regular feature in *Scientific Agriculture* will meet with the approval of members and subscribers. There has been a long-standing demand for articles of a more practical type from the point of view of the extension men and the commercial men. Practically all have been agreed that we should not encroach on the field of the farm journal, and it has been difficult to satisfy the demand.

We feel that the inclusion of economic survey material and the statistical appraisal of changing conditions from month to month should be of interest not only to field men but to practically all members of the C.S.T.A. It is one of our boasts in Canada that our research men are not divorced from the farmers' immediate fundamental problems. In fact, there are very few of our research men who are not in continual personal contact with farmers and students who are sons of farmers. It is not sufficient that technical agriculturists should be able to answer only questions on production in their special line of farm products. All of us are asked—if not as economists at least as

supposedly well-educated and well-informed citizens—to express our opinions on current economic problem as they affect the farmer. We are asked these questions by farmers usually in informal conversation as we sit and talk man to man, with the rôle of scientist or administrative officer laid aside. This is often the time when real leadership can be given. But it can't be given on a basis of snap opinions formed from a perusal of the daily press. It is surely worth while for any man in technical agriculture to take the time to study the economic picture as it will be presented monthly in the issues of *Scientific Agriculture*. While the present issue has been held up while arrangements were pending regarding the publication of the *Economic Annalist*, future issues will appear promptly and the information will be more timely.

C. S. T. A. GATHERING AT O. A. C.

A field day for Ontario sections of the C.S.T.A. was held at the Ontario Agricultural College at Guelph on September 30. The Niagara Branch and the Central Ontario Branch (Toronto) were guests of the O.A.C., C.S.T.A. and Faculty Club. A meeting was held in Memorial Hall where Dr. H. Barton, Dominion Deputy Minister of Agriculture spoke on the work of the National Advisory Committee on Agricultural Services, and H. L. Trueman reported on the Regina Convention and the World's Grain Exhibition and Conference.

About two hundred sat down to luncheon in Creelman Hall. Mr. J. B. Fairbairn, Deputy Minister of Agriculture for Ontario welcomed the gathering to the college, and Hon. Manning Doherty, formerly Minister of Agriculture for Ontario and at one time on the staff at Guelph spoke briefly. Following the luncheon the group enjoyed bowling, golf, and an exhibition of football. The ladies were the guests of the staff ladies at tea in Community House. Owing to the difficulty of holding a C.S.T.A. conference in any one province oftener than once in five or six years, the type of gathering held at Guelph is very valuable in bringing to members and their friends a picture of the activities of the Society. Quite apart from its value to the C.S.T.A., the day at Guelph was a pleasant reunion for many graduates of the old college, and the hospitality of Dr. Christie and the staff was greatly appreciated.

WORLD'S GRAIN EXHIBITION AND CONFERENCE PROCEEDINGS TO BE PUBLISHED BY THE C.S.T.A.

Work is proceeding rapidly on the publication of the Proceedings of the World's Grain Exhibition and Conference. Editing is being done under the direction of the Programme Committee of which Dr. E. S. Archibald is Chairman and Mr. H. L. Trueman, Secretary. Mr. E. Rhoades, Secretary of the World's Grain Exhibition and Conference, has returned to Ottawa and is working with the committee on this task. Secretaries of the various affiliated societies and groups of the C.S.T.A. are preparing technical material from their sections. The printing is being done by the Mortimer Company of Ottawa who printed the Proceedings of the World's Poultry Congress and who have a reputation for doing excellent work on scientific material.

It has been decided, owing to the amount of material available, to print the Proceedings in two volumes. The first volume will contain the papers presented at the Open Sessions, discussions, prize winners in the competitive classes, and papers delivered at the Economic and Engineering Sessions of the Conference. It is expected that this volume will be available for distribution by December 15th at a retail price of \$2.75 postpaid. Orders may be sent direct to the C.S.T.A., Box 625, Ottawa. In view of the present developments in wheat marketing, the material in Volume I has become of world-wide interest. Papers delivered at the Morning Sessions were representative of many schools of thought and are valuable as expressions of opinions held previous to the signing of the world wheat agreement. The papers are of interest not only to the expert but to the layman who desires to have some knowledge on this problem of wheat distribution, a problem which is vitally affecting our economic stability.

The second volume will be largely biological in nature containing about 150 papers delivered at the technical sessions. It is hoped that this volume will be ready by February 15th. An announcement as to the price of this volume will be made later. Volume II will comprise one of the best collections of scientific papers ever assembled on the sciences relating to grain production. Owing to the cost of printing and illustrations in connection with this type of material, the price will be higher than the first volume but comparable with publications of this type. A limited edition only will be printed and those who have not taken out memberships in the Grain Conference and who desire to secure this volume would do well to order as soon as the price and date of publication are definitely announced. Those who took out membership in the Grain Conference will, of course, receive both volumes. Reprints of papers published will be available to authors at cost.

JOINT C.S.T.A.—O.A.C. BANQUET

The annual joint C.S.T.A.—Ontario O.A.C. Alumni Association Banquet will be held in the Tudor Room of the Royal York Hotel, Toronto, on Friday, November 24th, at 6.45 p.m. This annual event has steadily increased in popularity and last year a few late arrivals were unable to secure seats. Several committee meetings of a national character will be held during the week, and the attendance of men from the East and the West is assured. The banquet will be the place to renew old friendships. Tickets will be available from members of the C.S.T.A. and Alumni Association Executives and at the door. It is hoped that Hon. A. Godbout, Minister of Agriculture for Quebec and President of the C.S.T.A., will be able to take part in the programme. Rev. Fr. Leopold, vice-president of the C.S.T.A. and well-known to many of the members, expects also to be present.

Dean E. A. Howes of Edmonton will be the guest speaker. The men in the East have not had a chance to hear Dean Howes for some years, and his happy combination of reminiscences, philosophy, and sound advice will be welcome.

POSITION OPEN IN DOMINION CIVIL SERVICE

Principal Clerk (Male), (Statistical), Agricultural Division, Dominion Bureau of Statistics, Department of Trade and Commerce at Ottawa, at an initial salary of \$1920. per annum. By legislation this salary is subject to a deduction of 10% during the fiscal year beginning April 1, 1933. While the appointment to be made at the present time is temporary in nature, this examination will qualify for permanent appointment. For such appointment the initial salary of \$1920. per annum will be increased upon recommendation for efficient service at the rate of \$120. per annum until a maximum of \$2400. has been reached.

Duties: To assist the Chief of the Agricultural Statistics Branch in the assemblies, analysis and publication of reports and estimates concerning the live stock industry; as required, to supervise a staff engaged in the collection and compilation of statistics related to the above and to cold storage; to specialize in statistical studies of agriculture, particularly in animal husbandry, and on a world basis, and to perform other related work as required.

Qualifications: Graduation from an Agricultural College of recognized standing with specialization in Animal Husbandry or Agricultural Economics, preferably with post-graduate work in Agricultural Economics including statistical research; full knowledge of live stock and of the live stock industry and of general agricultural economics; a knowledge of cold storage work, of the mechanism of the trade in live stock and of statistical methods in relation thereto; tact and good judgment.

While no definite age limit is set for this competition age may be a determining factor when making a selection.

An eligible list may be established which will be valid for the period of one year. Applications will be received up to November 10.